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Remission Rates And Long-Term Outcomes Of Relapsed Idiopathic Nephrotic Syndrome Children Treated With Cyclophosphamide Vs. Cyclosporin A

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Objectives : To assess remission rates and long-term outcomes in children with frequently-relapsing nephrotic syndrome (FRNS), steroid-dependent nephrotic syndrome (SDNS), or steroid-resistant nephrotic syndrome (SRNS) treated with cyclophosphamide or cyclosporin A (Cy A).

Methods : A retrospective review was conducted at Prince of Songkla University Hospital, southern Thailand from 2010 to 2021. Demographic data, treatment responses, and adverse events were recorded. The remission rates, incidences of infection and acute kidney injury (AKI) in FRNS/SDNS and SRNS were compared between oral cyclophosphamide and Cy A treatments.

Results : There were 148 relapsed NS children, 102 (68.9%) boys, with a median age of 4.6 (IQR 2.5-8.4) years. FRNS, SDNS, and SRNS accounted for 37 (25.0%), 50 (33.8%), and 61 (41.2%) children, respectively. The cyclophosphamide treatment group (N=135) had significantly higher remission rates in FRNS/SDNS than SRNS (63/85 (74.1%) vs. 11/50 (22.0%), $P<0.001$), while the difference in remission rates in the Cy A treatment group (N=53) was not statistically significant between FRNS/SDNS and SRNS (14/20 (70.0%) vs. 18/33 (54.5%), $P=0.265$). Patients who had the Cy A treatment had significantly higher proportions of infections and AKI than children in the cyclophosphamide treatment group (20/53 (37.7%) vs 10/95 (10.5%), $P<0.001$ and 21/53 (39.6%) vs 9/95 (9.5%), $P<0.001$, respectively). Of the 148 children, at a median follow-up time of 8.7 (IQR 5.2-12.2) years, 21 (14.2%) and 9 (6.1%) children had developed chronic kidney disease (CKD) stage III or end-stage kidney disease (ESKD), respectively. The mean duration from CKD stage III to ESKD was 5.0+5.5 months.

Conclusions : Seventy percent of FRNS/SDNS children achieved remission with either Cy A or cyclophosphamide, but the SRNS children achieved remission proportionately better with Cy A than cyclophosphamide. However, the Cy A-treated children had higher proportions of infections and AKI than the cyclophosphamide treatment group. Overall, one-fifth of the relapsed childhood NS children developed CKD.

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Table 1 Comparison of outcomes of cyclophosphamide vs cyclosporin treatments in children with frequently-relapsing nephrotic syndrome (FRNS)/steroid-dependent nephrotic syndrome (SDNS) vs steroid-resistant nephrotic syndrome (SRNS)

	FRNS/SDNS(%)	SRNS (%)	P-value
Cyclophosphamide			< 0.001
Complete remission	63 (74.1)	11 (22.0)	
Resistance	22 (25.9)	39 (78.0)	
Cyclosporin			0.265
Complete remission	14 (70.0)	18 (54.5)	
Resistance	6 (30.0)	15 (45.5)	