Management and Outcome of Coronavirus Disease 2019 (COVID-19) in Pediatric Cancer Patients: A Single Centre Experience from a Developing Country

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Background

Sufficient data pertaining to the impact of the Coronavirus disease 2019 on pediatric cancer patients is still lacking. The aim of this prospective study was to describe clinical management and outcomes of COVID-19 in pediatric oncology patients.

Materials & Methods

Conducted between May 1, 2020 and November 30, 2020, This study included 76 pediatric oncology patients with confirmed COVID-19. Remdesivir (RDV) was the antiviral therapy used. Allplex2019-nCoV Assay (Seegene, Seoul, South Korea) was used for Multiplex real-time PCR detection of SARS-CoV-2 according to manufacturer instructions.

Results

The median age of patients was 9 years. Sixty patients were on first-line treatment. Hematological malignancies constituted 86.8% of patients. Severe to critical infections were 35.4% of patients. The commonest symptom was fever (93.4%). Chemotherapy was delayed in 59.2% of patients and doses were modified in 30.2%. The 60-day overall survival (OS) stood at 86.8%, with mortalities occurring only among critical patients. Of sixteen acute leukemia patients in the first induction therapy, 13 survived and 10 achieved complete remission. A negative RT-PCR within 2 weeks and improvement of radiological findings were statistically related to disease severity (P = .008 and .002, respectively).

Better OS was associated with regression of radiological findings after 30 days from infection (P = .002). Forty-five patients received RDV, 42.1% had severe and critical forms of infection compared to 25.7% in the No-RDV group and yet OS was comparable in both groups.

TABLE 1: Demographic, cancer & chemotherapy details in relation to COVID-19 severity index (N=76)

Variables	COVID-19 clinical severity					
	Mild n=6 (7.8%)	Moderate n=43 (56.5%)	Severe n=15 (19.7%)	Critical n=12 (15.7%)	Total n=76 (100%)	P value
Gender						
Female	2 (33.3%)	18 (41.8%)	8 (53.3%)	6 (50.0%)	34 (44.7%)	0.82
Male	4 (66.6%)	25 (58.1%)	7 (46.6%)	6 (50.0%)	42 (55.2%)	
Age category						
≤ 2 years	1 (16.6%)	3 (6.9%)	2 (13.3%)	0	6 (7.8%)	0.2
>2≤10 years	2 (33.3%)	17 (39.5%)	10 (66.6%)	7 (58.3%)	36 (47.3%)	
>10 years	3 (50.0%)	23 (53.4%)	3 (20.0%)	5 (41.6%)	34 (44.7%)	
Cancer Diagnosis						
Hematological malignancies	**5 (83.3%)**	**39 (90.6%)**	**11 (73.3%)**	**11 (91.6%)**	**66 (86.8%)**	
ALL/LL	3 (50.0%)	24 (55.8%)	8 (53.3%)	3 (25.0%)	38 (50.0%)	
AML	1 (16.6%)	11 (25.5%)	2 (13.3%)	6 (50.0%)	20 (26.3%)	
Lymphoma	1 (16.6%)	2 (4.6%)	0	2 (16.6%)	5 (6.5%)	
CML	0	2 (4.6%)	1 (6.6%)	0	3 (3.9%)	0.15
Solid tumors	**0**	**3 (6.9%)**	**3 (20.0%)**	**0**	**6 (7.8%)**	
Neuroblastoma	0	2 (4.6%)	1 (6.6%)	0		
RMS/NRMS	0	1 (2.32%)	2 (13.3%)	0		
CNS tumors	**1 (16.6%)**	**0**	**1 (6.6%)**	**1 (8.3%)**	**3 (3.9%)**	
Others*	0	0	1 (6.6%)	0	1 (1.3%)	
Chemotherapy cycles after COVID-19 confirmation						
Cycles delayed without modification	1 (16.6%)	16 (37.2%)	4 (26.6%)	1 (8.3%)	22 (28.9%)	
Cycles delayed and modified	2 (33.3%)	14 (32.5%)	6 (40.0%)	1 (8.3%)	23 (30.2%)	0.8
No protocol adjustment (incl. no further cycles)	2 (33.3%)	8 (18.6%)	3 (20.0%)	2 (16.6%)	15 (19.7%)	
NA (under follow up/died before next cycle)	1 (16.6%)	5 (11.6%)	2 (13.3%)	8 (66.6%)	16 (21.0%)	
Duration of delay in chemotherapy cycles (N=45)	**3 (50.0%)**	**30 (69.7%)**	**10 (66.6%)**	**2 (16.6%)**	**45 (59.2%)**	
≤15 days	2 (66.6%)	12 (40.0%)	5 (50.0%)	0	19 (42.2%)	0.8
>15≤30 days	1 (33.3%)	11 (36.6%)	3 (30.0%)	1(50.0%)	16 (35.5%)	
>30 days	0	7 (16.2%)	2 (20.0%	1(50.0%)	10 (22.2%)	
Type of Chemotherapy modifications (N=23)	**2 (33.3%)**	**14 (32.5%)**	**6 (40.0%)**	**1 (8.3%)**	**23 (30.2%)**	
25% dose reduction	2 (100%)	13 (92.8%)	5 (83.3%)	0	20 (26.3%)	
Line of treatment changed	0	1 (7.1%)	1 (16.6%)	1 (100%)	3 (3.94%)	

TABLE 2: Clinical characteristics in relation to COVID-19 clinical severity (N=76)

Variables	COVID-19 clinical severity					
	Mild n=6 (7.8%)	Moderate n=43 (56.5%)	Severe n=15 (19.7%)	Critical n=12 (15.7%)	Total n=76 (100%)	P value
Clinical signs of COVID-19						
Fever	6 (100%)	40 (93.0%)	13 (86.6%)	12 (100%)	71 (93.4%)	0.6
Cough	2 (33.3%)	24 (55.8%)	6 (40.0%)	9 (75.0%)	41(53.9%)	0.2
Tachypnea	0	4 (9.3%)	10 (66.6%)	5 (41.6%)	19 (25.0%	**0.001**
Hypoxemia at presentation	0	0	9 (60.0%)	9 (75.0%)	18 (23.6%)	**0.001**
O2 saturation						
<90%	0	0	4 (26.6%)	4 (33.3%)	8 (86.5%)	
≥90-<95%	0	0	5 (33.3%)	5 (41.6%)	10 (13.1%)	**0.001**
≥95%	6 (100%)	43 (100%)	6 (40.0%)	3 (25.0%)	58 (76.3%)	
Diarrhea	0	6 (13.9%)	2 (13.3%)	4 (33.3%)	12 (15.7%)	0.3
Loss of smell/taste						0.1
Yes	3 (50.0%)	16 (37.2%)	3 (20.0%)	1 (8.3%)	23 (30.2%)	
Not assessed	2 (33.3%)	20 (46.5%)	6 (40.0%)	9 (75.0%)	37 (48.6%)	
Sore throat						
Yes	2 (33.3%)	14 (32.5%)	3 (20.0%)	1 (8.3%)	20 (26.3%)	0.4
Not assessed	2 (33.3%)	19 (44.1%)	6 (40.0%)	8 (66.6%)	35 (46.0%)	
Duration of symptoms before confirming COVID-19						
≤ 7 Days	5 (83.3%)	36 (83.7%)	10 (66.6%)	10 (83.3%)	61 (80.2%)	0.52
> 7 days	1 (16.6%)	7 (16.2%)	5 (33.3%)	2 (16.6%)	15 (19.7%)	
Length of hospital stay (days) Median, range (14, 4-55)						
≤14 days	1 (16.6%)	25 (58.1)	7 (46.6%)	5 (41.6%)	38 (50.0%)	0.34
>14 days	3 (50.0%)	15 (34.8%)	8 (53.3%)	7 (58.3%)	33 (43.4%)	
Home isolation	2 (33.3%)	3 (6.9%)	0	0	5 (6.5%)	
Survival status						
Alive	6 (100%)	43 (100%)	15 (100%)	2 (16.6%)	66 (86.8%)	**0.001**
Dead	0	0	0	10 (83.3%)	10 (13.1%)	

Conclusion

Most pediatric cancer patients with COVID-19 should have good clinical outcomes except for patients with critical infections. Cancer patients can tolerate chemotherapy including induction phase, alongside COVID-19 treatment. In severe and critical COVID-19, RDV might have a potential benefit.

References

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