

Background

Hematopoietic stem cell transplantation (HSCT) became an integral component of the treatment of various pediatric malignancies. Post-transplant central nervous system complications (CNSC) are major contributors to morbidities in transplanted patients. Our main aim is to describe the patterns of CNSC after HSCT in pediatric oncology patients using CT and/or MRI.

Materials & Methods

This retrospective study included pediatric patients transplanted between 2011 and 2019. Cases were treated at the Children's Cancer Hospital Egypt (CCHE-57357). The study included pediatric cases who had undergone allogeneic- or autologous-HSCT. **Interventions:** Computed tomography (CT) and/or magnetic resonance imaging (MRI) studies were evaluated for the detection and characterization of CNSC. Imaging was done following any neurological symptoms post-transplant. Brain structural abnormalities were classified as cerebrovascular complications (intra-parenchymal hemorrhage and venous thrombosis), infection, disease recurrence, atrophy, and treatment-related toxicities (posterior reversible encephalopathy syndrome [PRES] and leukoencephalopathy).

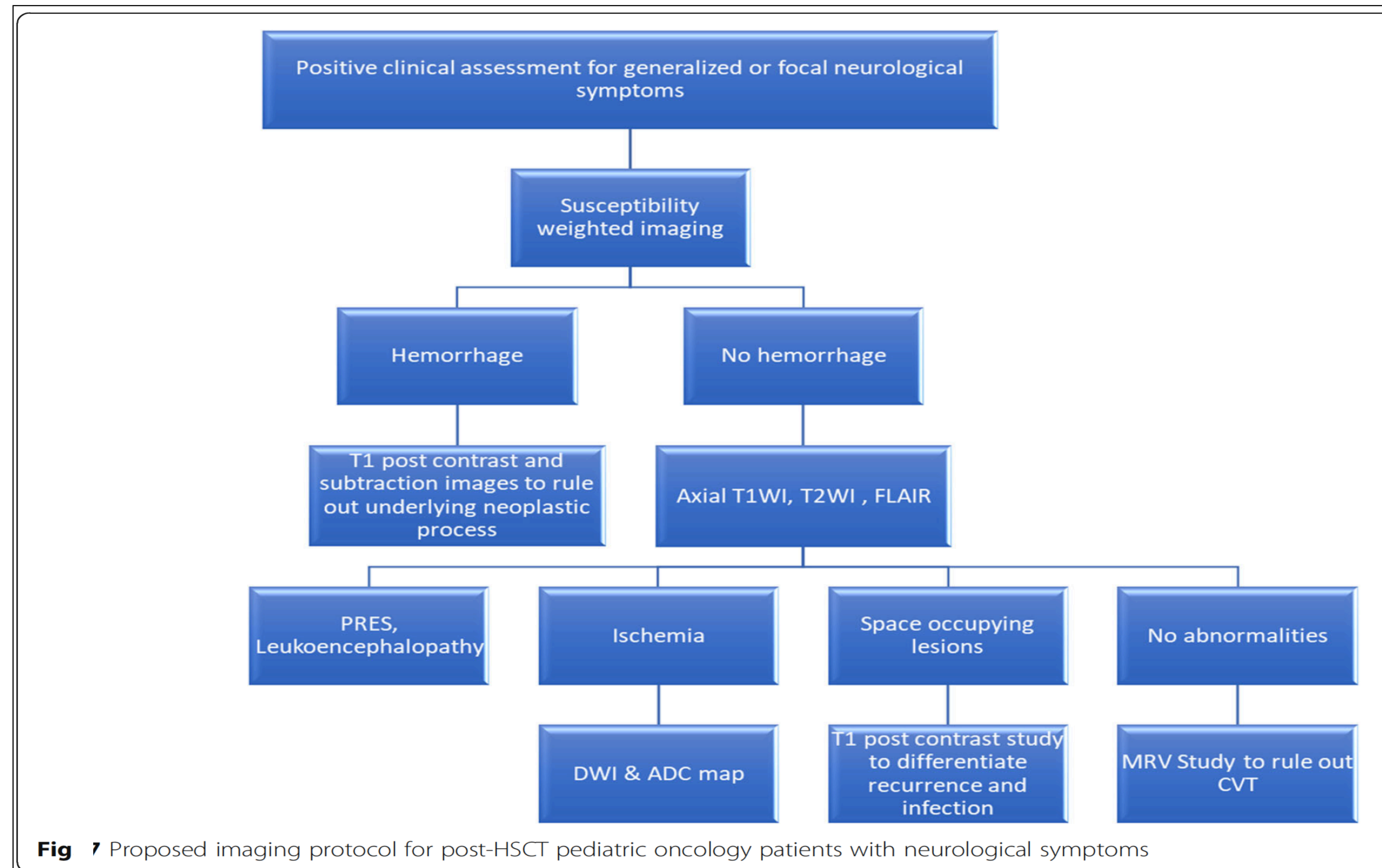


Fig 7 Proposed imaging protocol for post-HSCT pediatric oncology patients with neurological symptoms

Results

Median follow-up for survivors was 48 months (range: 6–109 months). Hematological malignancies constituted 58% of cases. The median age was 6.5 years (range: 0.9–25 years). Sixty-eight cases (13%) presented cumulatively with 77 clinical episodes of neurological complications. The cumulative frequency of CNSC at 100 days was 5.3%. A higher incidence was observed in allogeneic-HSCT (15.9 %) compared to autologous-HSCT (11%). The most common CNSC was disease recurrence in 28/77 (36.4%), with 89% occurrence after autologous-HSCT, followed by PRES in 17/77 (22%) episodes. Females were 4.2 times as susceptible to developing PRES as males ($p < 0.006$), and 35.5% of PRES was detected in acute myeloid leukemia cases. Disease recurrence, atrophy, and infection were more common after 100 days post-HSCT, while PRES was more common in the first 100 days.

Table 1: Characteristics of HSCT patients

	Total cases N (%)	AutoSCT N (%)	AlloSCT N (%)
Sex			
Female	190 (36.1%)	114 (36.6%)	76 (35.5%)
Male	335 (63.8%)	197 (63.3%)	138 (64.4%)
Initial diagnosis			
Neuroblastoma	210 (40%)	208 (66.9%)	2 (0.9%)
Non-Hodgkin lymphoma	21 (4%)	11 (3.5%)	10 (4.7%)
Acute myeloid leukemia	76 (14.5%)	2 (0.6%)	74 (34.6%)
Acute lymphoblastic leukemia	44 (8.2%)	1 (0.32%)	43 (20.1%)
Myelodysplastic/myeloproliferative syndrome	80 (15.2%)	0 (0%)	80 (37.3%)
Hemophagocytic lymphohistiocytosis	5 (1%)	0 (0%)	5 (2.3%)
Hodgkin lymphoma	77 (14.7%)	77 (24.8%)	0 (0%)
Relapsing Wilms's	2 (0.4%)	2 (0.6%)	0 (0%)
Extraocular retinoblastoma	10 (1.9%)	10 (3.2%)	0 (0%)
Total	525 (100%)	311 (100%)	214 (100%)

Table 2: Incidence of CNS complications post-HSCT

CNS complications	Number of CNS events 0–100 days post-HSCT (n = 30) N (%)	Number of CNS events > 100 days post-HSCT (n = 47) N (%)
PRES	13 (43.3)	4 (8.5%)
Leukoencephalopathy	4 (13.3)	6 (12.7)
Venous thrombosis	3 (10)	2 (4.2)
Hemorrhage	3 (10)	5 (10.6)
CNS recurrence	6 (20)	22 (46.8)
Infection	0 (0%)	2 (4.2)
Atrophy	1 (3.3%)	3 (6.3)
Osmotic demyelination syndrome	0 (0%)	1 (2.1)
Mineralizing microangiopathy	0 (0%)	1 (2.1)
Cortical laminar necrosis	0 (0%)	1 (2.1)

Conclusion

The frequency of post-transplant CNSC is higher in allogeneic-HSCT compared to autologous-HSCT. The pattern of CNSC differs according to the time interval post-HSCT. Expert imaging interpretation is needed for early detection and proper management of CNSC post-HSCT.

References

- (1).ColomboAA, Marchioni E, Diamanti L, et al (2017) Neurological complications involvingthe central nervous system after allogeneic hematopoietic stem cell transplantation during a period of evolution in transplant modalities: A cohort analysis. Transplantation 101:616–623. (2).Emad-Eldin S, Abdel-Moeti M (2014) Brain MR imaging abnormalities in pediatric patients after allogeneic bone marrow transplantation. Egypt J Radiol Nucl Med 45:1265–1274.