ENDOCRINE MONITORING AND OUTCOME AFTER THERAPY IN CHILDHOOD CANCER SURVIVORS OF CENTRAL NERVOUS SYSTEM TUMOURS

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INTRODUCTION

Childhood cancer survivors (CCS) of Central Nervous System tumours are at lifelong increased risk of endocrinopathies; as a consequence of cranial or craniospinal radiotherapy and alkylating agents. Hypothalamic-pituitary dysfunction, thyroid dysfunction and gonadal failure are frequently seen.

Growth hormone (GH) deficiency has been associated with radiotherapy doses of ≥1800cGy to the hypothalamic region. Hypogonadotropic hypogonadism (HH), hypothyroidism or ACTH insufficiency have been associated with radiotherapy doses of ≥30000cGy.

AIM

To explore the endocrine monitoring following completion of treatment for central nervous system tumours within a regional paediatric oncology service.

METHOD

Children who received radiotherapy as part of treatment for CNS tumours between 2004-2019, identified from a departmental database, were included.

Confirmatory tests used to exclude or diagnose were:

- GH stimulation test (arginine test) for GH deficiency
- TSH & free T4 for hypothyroidism
- ACTH stimulation test for pituitary-adrenal axis
- Gonadotrophins (LH, FSH) for hypogonadotrophic hypogonadism
- Oestradiol & AMH (girls) and testosterone & AMH (boys) for gonadal failure (GF)

RESULTS

Of 100 CCS (38 treated for medulloblastoma, 62 for other CNS tumours), 43 (43%) completed treatment successfully.

	ALL	Medulloblastoma	Other CNS Tumours	*p*
n	43	19 (50%)	24 (39%)	*0.30*
Females	23 (53%)	5 (26%)	18 (75%)	*0.02*
Age (years) at diagnosis	7.6 (0.7, 16.3)	7.5 (3.3, 16.3)	8.7 (0.7, 15.7)	*0.90*
Years since completion of treatment	6.25 (1.3, 14.4)	4.58 (1.3, 11.6)	6.83 (2.0, 14.4)	*0.03*
Total dose of radiotherapy received	5400cGy (50, 8000)	5540cGy (4420, 8000)	5400cGy (50-6000)	*<0.0001*

Values: median (range) or number (percentage frequency)

Table 1: Characteristics of all children included

Endocrine test	ALL	Medulloblastoma	Other CNS Tumours	*p*
GH stimulation	1.3 (0.3, 6.5)	1.3 (0.8, 3.3)	1.5 (0.3, 6.5)	*0.22*
TSH & free T4	1.4 (0.1, 6.9)	1.1 (0.1, 3.3)	1.8 (0.3, 6.9)	*0.210*
ACTH stimulation	2.3 (0.7, 8.8)	2.0 (0.8, 8.8)	2.5 (0.7, 7.8)	*0.518*
Gonadotrophins	1.7 (0.1, 6.9)	1.7 (0.1, 6.6)	2.3 (0.5, 6.9)	*0.471*
Gonadal function	3.0 (0.1, 6.6)	2.9 (0.1, 6.6)	4.9 (1.0, 6.6)	*0.022*

Values: median (range)

Table 2: Years since completion of cancer treatment to the endocrine test performed; comparison of medulloblastoma and other tumour types

Endocrine tests performed

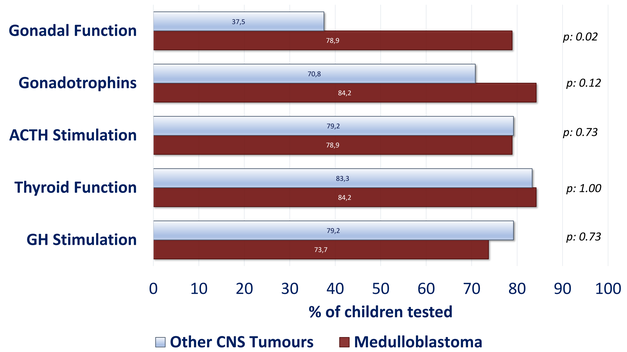

Figure 1: Endocrine tests and the percentage of children tested post-treatment; comparison of medulloblastoma and other tumour types

Endocrine deficiency	ALL	Medulloblastoma	Other CNS Tumours	*p*
GH Deficiency	30/33 (90%)	14/14 (100%)	16/19 (84%)	*0.89*
Hypothyroidism	16/36 (44%)	11/16 (69%)	5/20 (25%)	*0.018*
ACTH Insufficiency	5/34 (15%)	1/15 (7%)	4/19 (21%)	*0.58*
HH	4/33 (12%)	1/16 (6%)	3/17 (18%)	*0.60*
Gonadal failure	7/24 (29%)	1/15 (7%)	6/9 (67%)	<0.0001

Values: number (percentage frequency)

Table 3: Endocrine deficiencies diagnosed in those CCS who had the relevant tests performed; comparison of medulloblastoma and other tumour types

Overlap between endocrinopathies

ALL patients who had hypogonadotrophic hypogonadism, hypothyroidism or ACTH insufficiency also had GH deficiency

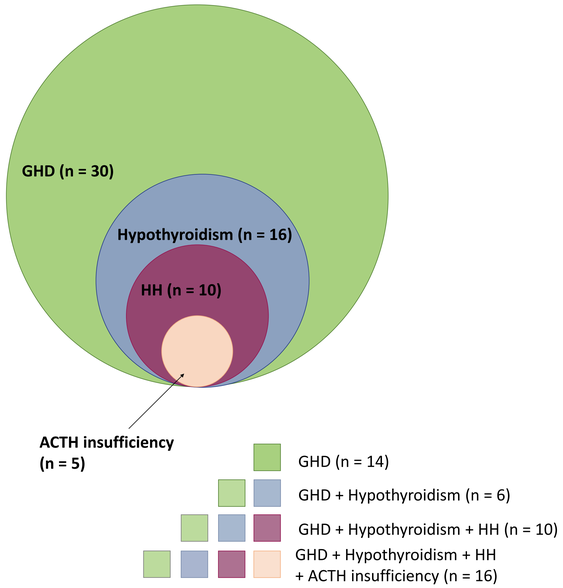

Figure 2: Relative proportions and overlap between endocrinopathies following radiotherapy treatment in childhood cancer survivors of CNS tumours

CONCLUSIONS

The majority of children had appropriate monitoring for endocrine sequelae following treatment of CNS tumours; however, there was variability and occasionally a significant delay in the timing of the initial endocrine evaluation.

A systematic approach to monitoring for endocrine complications would ensure timely management and treatment.

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