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Incidence of cranial MRI abnormalities in patients with isolated growth hormone deficiency: 20 years of results

Background

Patients with isolated growth hormone deficiency (GHD) will routinely have magnetic resonance imaging (MRI) of the pituitary and brain to assess pituitary size and presence of any intracranial lesions. The result may change the threshold for monitoring for further hormone deficiencies. However the test may also detect unexpected or unrelated abnormalities.

Methods

The biochemistry and MRI reports of children with isolated GHD (peak GH <7ug/L) born in a tertiary centre between 1997 from 2017 were reviewed. All children with multiple pituitary hormone deficiencies, septo-optic-dysplasia spectrum, and patients with known malignancies were excluded. Extra-cranial abnormalities were excluded.

Aim

To review the incidence of abnormal pituitary magnetic resonance imaging in children with a diagnosis of isolated GHD, and to characterise the types of abnormalities seen.

Results

81 children were diagnosed with isolated GHD. Of these, 72 children had MRI results available (figure 1). Median age of diagnosis was 5.99 years (range 0.62-18.69) with a median height SDS or -3.45 (-0.33 to -8.41) at diagnosis. The median GH level was 3.25µg/L, with the same rate of abnormalities in the group above and below the median GH level.

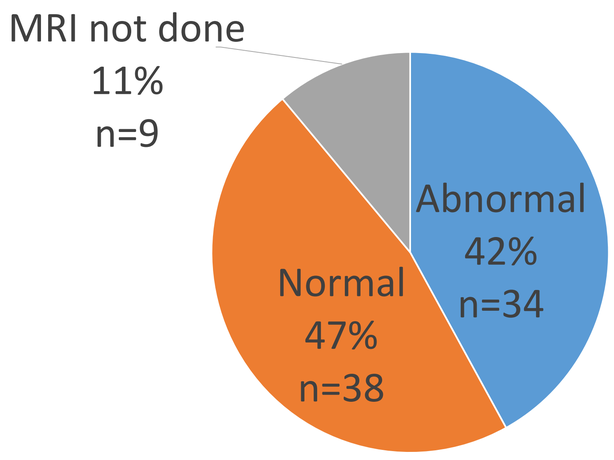

Figure 1. MRI Normal versus abnormal

Of the 34 children who had abnormal findings on an MRI scan, abnormalities were subdivided into pituitary, infundibular and brain abnormalities (figure 2).

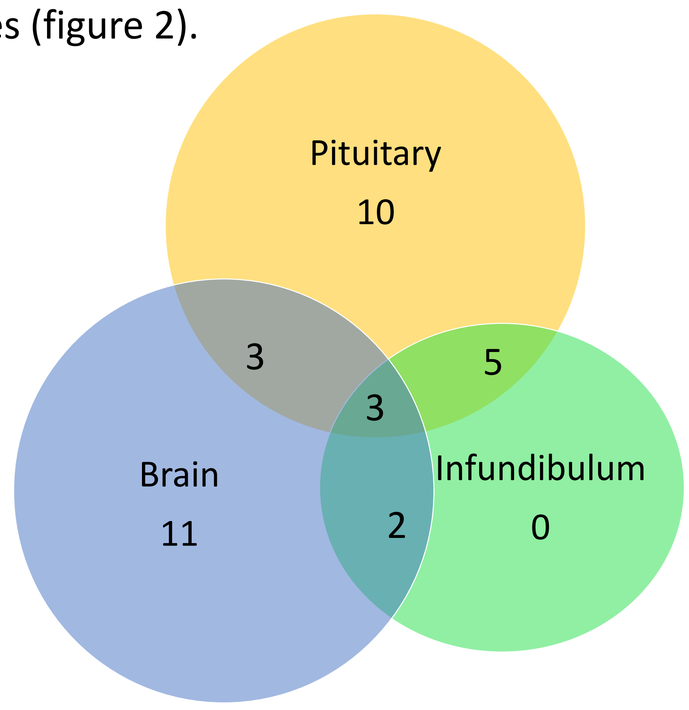

Figure 2. Types of MRI abnormality

Pituitary abnormalities: . Eighteen patients had anterior pituitary abnormalities (figure 3), 8 patients had posterior pituitary abnormalities, and 10 patients had infundibular changes.

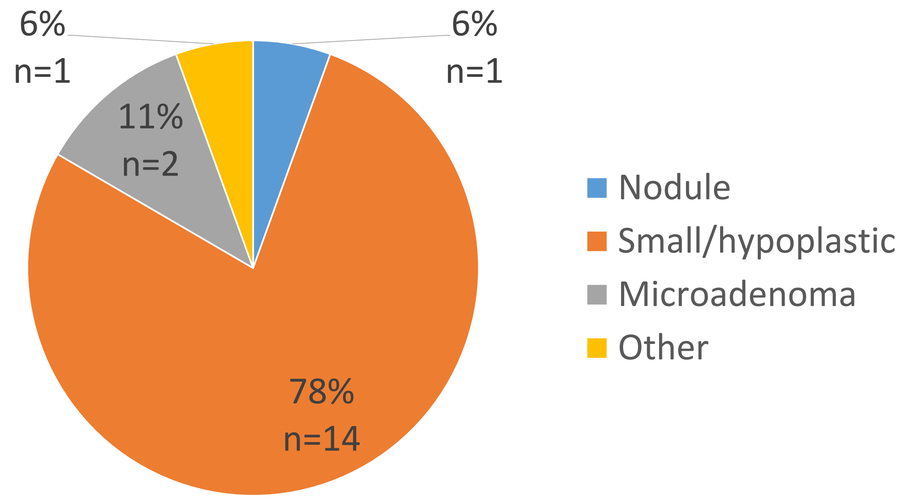

Figure 3. Anterior Pituitary Abnormalities

Of the posterior pituitary abnormalities, 6 patients had an ectopic posterior pituitary and 2 patients had an absent posterior pituitary gland. Infundibular changes included a hypoplastic or absent infundibulum (n=6), a deviated or displaced infundibulum (n=3) and presence of an infundibular lipoma (n=1).

Additional abnormalities: 16 children had other abnormalities noted (see list below). Of the 4 patients with Chiari malformations, 3 children also had pituitary abnormalities

<u>Non-pituitary cranial abnormalities:</u>

- Arnold Chairi malformation (n=4)
- Arachnoid cyst (n=3)
- Hypothalamic hamartoma (n=1)
- Ventricular enlargement (n=1)
- Other (e.g. white matter changes) (n=8)

Conclusions And Learning Points

Nearly half the children with isolated GHD had an abnormal MRI scan. The most frequent abnormality is pituitary hypoplasia, followed by infundibulum and then posterior pituitary abnormalities. One fifth had additional cranial anomalies; with 4 (5.6%) having a Chiari malformation. Chiari malformation in GHD is an uncommon but recognised association, and patients with this condition may need additional monitoring if given growth hormone treatment.