Picture story

Intracranial germinoma presenting as pseudo precocious puberty in a child with Down syndrome

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Introduction

Down syndrome (DS) is the commonest chromosomal disorder in children with an incidence of 1 in every 733 live births[1]. Solid tumours are a rare occurrence in Down syndrome[1,2]. Here, we report a case of intracranial germinoma in a boy with Down syndrome presenting with precocious puberty and right sided hemiparesis.

Case report

A ten-year-old boy with DS presented with weakness of right side of the body and slurring of speech for four months. He had been investigated for precocious puberty two years prior to this admission, when his parents noticed increased penile length and pubarche at the age of 8 years. The investigations available on admission, revealed that he had advanced bone age (bone age 13½ years at chronological age of 9), with elevated serum testosterone and beta human chorionic gonadotrophin (HCG) levels (Table 1). However, his luteinizing hormone (LH) and follicle stimulating hormone (FSH) levels were normal. Ultrasound scan of the abdomen and genitalia were normal. Computed tomography scan of abdomen, pelvis and chest done in search of a possible Beta HCG secreting tumour were also normal.

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Four months prior to current presentation, parents have noticed that the boy was having occasional falls while walking which progressed to weakness of the right side of the body. He also developed slurring of speech and aggressive behaviour during the same period.

On examination, his height was 141 cm (more than 95th centile in Down syndrome specific growth chart) and weight was 27 kg (10th – 25th centile). The testicular volume was less than 4ml (normal pre-pubertal volume <4 ml). However, the stretched penile length was 11cm (more than 90th centile). The pubic hair pattern and stretched penile length were in pubertal stage 4.

Neurological examination revealed diminished muscle power and increased reflexes on the right side. Upper motor type of facial nerve palsy was also noted on the same side. His cardiovascular system was normal and blood pressure was 110/70mmHg (between 50th–90th centile). Abdominal examination and respiratory examination did not reveal any abnormality.

Magnetic resonance imaging (MRI) of brain revealed a tumour, involving the frontal and temporal lobes of the left cerebral hemisphere measuring 55mm × 36mm × 31mm (Figure 1).

The tumour was compressing the 3rd ventricle causing obstructive hydrocephalus. (Figure 2).

Ventricular-peritoneal shunt was inserted and a biopsy was taken from the tumour. Biopsy confirmed the diagnosis of intracranial germinoma. The child was referred to the oncology unit for treatment and chemotherapy was commenced. After the first phase of chemotherapy, child had significant clinical improvement in gait and behaviour

Table 1: ***Investigation results on admission***

Investigation	Result	Normal Range	Units
Thyroid stimulating hormone	2.11	0.7- 4.61	mIU/L
Thyroxine	11.9	9- 25	pmol/L
Prolactin	188.78	73- 407	mIU /L
Beta human chorionic gonadotrophin	34.6	<5	nIU/ml
Testosterone	26.17	6-9 years: 0.01- 1.04	nmol/L
Luteinizing hormone	<0.07	0.08- 8.0	IU/L
Follicle stimulating hormone	<0.07	0.1- 11.3	IU/L
Alpha feto protein	4	0.5 -7	ng/ml
17- hydroxy progesterone	3.29	0.01- 0.45	ng/ml

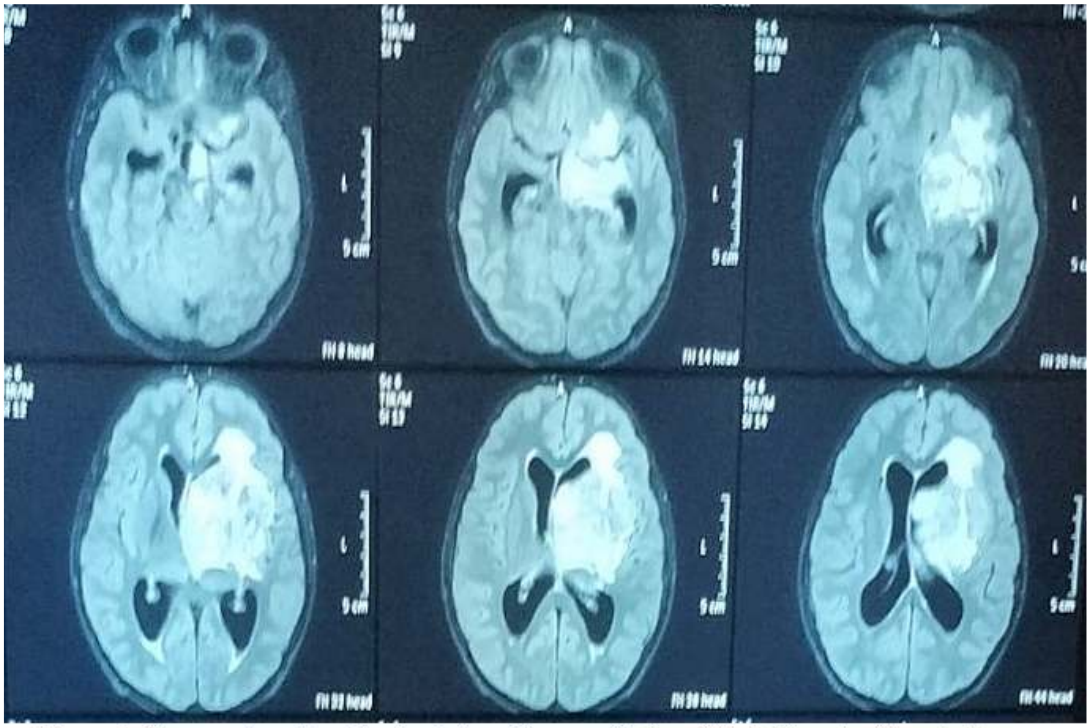

Figure 1: ***Tumour involving the frontal and temporal lobes of the left cerebral hemisphere***

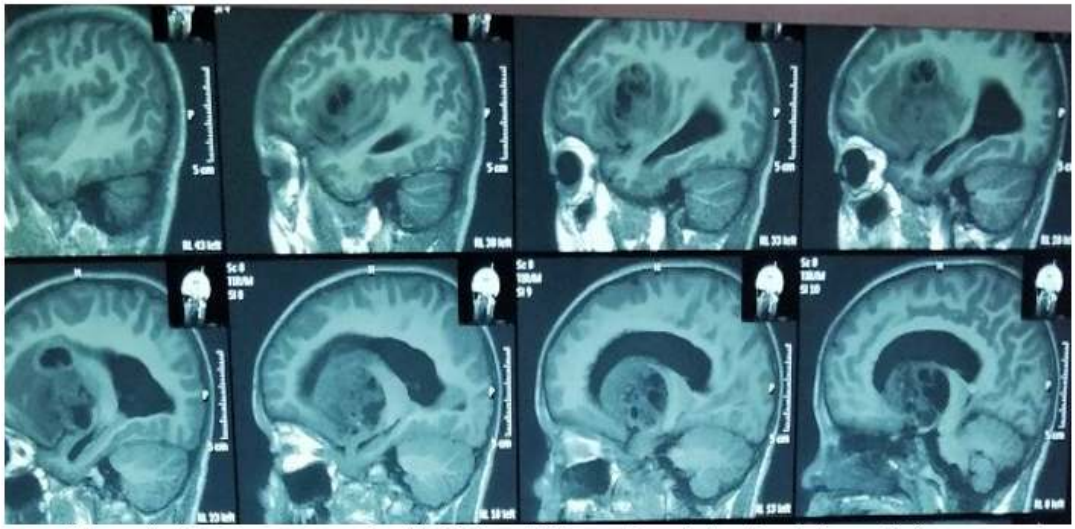

Figure 2: ***Tumour compressing the 3rd ventricle causing obstructive hydrocephalus***

Discussion

Precocious puberty is the appearance of secondary sexual characteristics before the age of 8 years in females and 9 years in males[3]. Early activation of hypothalamo-pituitary-gonadal axis results in central precocious puberty, whereas increased secretion of sex hormones irrespective of the maturation of central axis result in gonadotropin independent (peripheral) precocious puberty[4]. Precocious puberty in males is almost always pathological[4]. The evidence of pubarche and increased penile length with pre-pubertal testicular volume at 8 years, suggests peripheral precocious puberty in this child. Normal serum FSH, LH with high testosterone confirmed the diagnosis. The source of elevated beta HCG was likely to be intracranial germ cell tumor. Beta HCG has structural similarity to LH which has resulted in increased testosterone production leading to pseudo (peripheral) precocious puberty.

A germinoma accounts for 3-5% of all intracranial tumours in children and predominantly occurs in the first two decades of life[5]. During fetal life, germ cells migrate to the reproductive organs. However, these germ cells can become trapped in the brain in the event of migration failure during fetal life. The clinical presentation of these lesions is mainly related to the location and size of the tumour[6]. Children with DS are predisposed to developing transient myeloproliferative disorder and acute megakaryocytic leukaemia[1]. However, solid brain tumours are rare with DS[2]. Only 14 associations of DS and brain tumor were reported in the literature. Out of that 6 were germinomas[7]. The first such case was reported by Fujita *et al* in 1992[8]. Since our patient is also having a germinoma, the association of intracranial germinoma with DS could have a clinical significance.

The prognosis of pure intracranial germinoma is good compared to non-germinoma germ cell tumours. Germinomas are highly responsive to radiotherapy. Chemotherapy reduces the long-term morbidity associated with radiation therapy while maintaining the excellent survival rates[9]. Our patient is responding to chemotherapy and is currently awaiting radiotherapy.

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