PERIPHERAL PRECOCIOUS PUBERTY IN CHILDREN: THE ROLE OF RADIOLOGIC IMAGING

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ABSTRACT

Puberty is a process leading to physical and sexual maturation. The diagnosis is made with the help of careful history and physical examination in conjunction with the use of appropriate radiological and hormonal evaluation.

To evaluate the role of radiological imaging in determining the etiology a retrospective review of patients with peripheral precocious puberty were reviewed. Nineteen patients were diagnosed to have peripheral precocious puberty. Various forms of congenital adrenal hyperplasia and hypothyroidism were the commonest found in 8 and 5 patients respectively. Other etiologies included Adenocarcinoma in two, and Adrenal adenoma, Ovarian cyst, Granulosa Cell tumor, and McCune-Albright syndrome presented in one patient each.

Various radiological studies are important in the assessment and identifying the etiologies of peripheral precocious puberty.

INTRODUCTION

Puberty is a process leading to physical and sexual maturation manifested by an increase in growth rate, and the appearance of secondary sexual characteristics. The onset before 8 years in girls and 9 years in Boys is termed as precocious puberty (PP). The causes may range from a variant of hormonal development (e.g. Isolated premature adrenarche or isolated premature thelarche) to pathological conditions with significant risk of morbidity and even death (e.g. malignant germ cell tumor and astrocytoma).

Peripheral precocious puberty (PPP) is the term used to designate forms of pathologic precocious puberty that are not mediated to the hypothalamic pituitary axis. Peripheral precocious puberty maybe subdivided by etiology as congenital or acquired. The pediatric radiologist plays an important role in diagnosis (1-6).

This study will assess the value of the various radiologic imaging in diagnosis and identifying the etiology of peripheral precocious puberty.

MATERIALS AND METHODS

This is a retrospective Hospital based study included patient with the diagnosis of peripheral precocious puberty which were seen in the Pediatric Endocrine services, King Khalid University Hospital (KKUH) Riyadh, Saudi Arabia in the period January 1990 and December 2016.

Data reviewed included age, sex, clinical characteristics and relevant hormonal and radiological investigations.

RESULTS

During the period under review, 19 patients were diagnosed to have Peripheral Precocious Puberty (PPP); 15 (79%) girls and 4 (21%) boys. Various forms of Congenital Adrenal Hyperplasia (CAH), and Hypothyroid were the commonest found in; eight and five (42.1% and 26.3%) respectively. Table 1; other etiological case included adrenocarcinoma in two, and adrenal adenoma, ovarian cyst, granulosa cell tumor, and McCune-Albright in one patient each.

DISCUSSION

Precocious Puberty is defined as the development of secondary sexual characteristics before the age of 8 years in girls, and 9 years in the boys. Two types of precocious puberty are recognized, central precocious puberty (CPP), resulting from early activitation of the hypothalamic-pituitary axis, the so called gonatrophin-dependent precocious puberty, and peripheral precocious puberty (PPP) which results from the production of the sex steroids (oestrogen or testosterone) from the extra gonadal tissue which is also not gonatrophin-dependent., i.e. gonadotrophin-independent. (1-6)
The initial evaluation begins with detailed history and physical examination. Findings of interest such as, café-au-lait spots, hyperpigmentation, bony deformities and testicular or abdominal mass. (7,8) The Pediatric radiologist plays an important role in diagnosis. (9-10). Radiography of the left hand and wrist used to determine bone age is a quick and helpful means to estimate its likelihood of precocious puberty and spread of progression. If bone age is within one year of chronological age, puberty has not started, in contrast, if bone advanced by two years or more, puberty like has been present for sometime (11). Bone age is usually delayed in hypothyroidism which indicates the importance of performing thyroid function (Thyroid Stimulating Hormone, TSH, and Free Thyroxide, FT4,) and later the possibility of performing thyroid scan and even ovarian ultrasound to look for the possibility of multiple ovarian cysts. However, thyroid function is not a routine requirement in the evaluation of precocious puberty (12, 13). If congenital adrenal hyperplasia (CAH) is suspected, e.g hyperpigmentation, serum 17- hydroxy-progesterone and other androgens should be performed (14).

If an adrenal tumor is suspected in patient with either virilization or feminization a Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) of the adrenal gland is indicated, fig.1 (15). The Ultrasound Scan of the adrenal gland is of limited value. Pelvic ultrasonography is essential when PPP is suspected because an ovarian tumour or cyst, fig. 2, may be detected. Ultrasonography can characterize cystic lesions and can monitor their progress (16,17).
In McCune-Albright Syndrome, Magnetic Resonance Imaging (MRI) of the adrenals can detect multiple adrenal hyperplastic nodules. Also, MRI brain to rule out a pituitary adenoma. (18), Thyroid scan maybe needed to rule out nodular hyperplasia presenting with thyrotoxicosis. A bone scan (fig. 3), and skeletal survey to identify the bony lesions of polyosetic fibrous dysplasia are also indicated.

In conclusion, various radiological studies are important to the assessment and identifying the various etiologies of peripheral precocious puberty.

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