



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

International Journal of Recent Scientific Research
Vol. 8, Issue, 1, pp. 15168-15170, January, 2017

**International Journal of
Recent Scientific
Research**

Research Article

PERIPHERAL PRECOCIOUS PUBERTY IN CHILDREN: THE ROLE OF RADIOLOGIC IMAGING

Ahmed H. AlShaer., Rushaid NA. Al Jurayyan and Nasir AM. Al Jurayyan

Departments of Pediatrics and Radiology and Medical Imaging College of Medicine and King Khalid University Hospital (KKUH), King Saud University Riyadh, Saudi Arabia

ARTICLE INFO

Article History:

Received 15th October, 2016
Received in revised form 25th
November, 2016
Accepted 23rd December, 2016
Published online 28th January, 2017

Key Words:

Children, etiology, evaluation, radiology,
peripheral, precocious, puberty.

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 form 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.

Copyright © Ahmed H. AlShaer et al, 2017, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

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 cause included adenocarcinoma in two (10.5%) and adrenal adenoma, ovarian cyst, granulosa cell tumor, and Mc Cure- Albright in one patient (5.3%) 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 activation 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)

*Corresponding author: **Ahmed H. AlShaer.**,
Department of Mathematics, Yanbian University, China

Table Etiology of Peripheral Precocious Puberty (Gonadotrophin Independent) in 19 patients

DIAGNOSIS	SEX	
	MALE	FEMALE
Congenital Adrenal Hyperplasia		
21 Hydroxylase deficiency	-	3
11 Hydroxylase -B- deficiency	2	3
Hypothyroidism	1	4
Adrenal Adenoma (Oestrogen secreting)	1	-
Adeno Carcinoma	-	2
Ovarian Cyst	-	1
Theca Cell Tumor	-	1
McCune-Albright Syndrome	-	1
TOTAL	4	15



Figure 1, An ultrasonography Scan Showing multiple ovarian cysts in a 6 years old boy with acquired hypothyroidism.



Figure 2 Computed Tomography (CT) Scan of abdomen showing right adrenal adenoma (Oestrogen- Secreting)



Figure 3 TC 99m Bone Scan from a patient with McCune-Albright Syndrome showing areas of increased tracer uptake.

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 hyper pigmentation, 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 polyostotic fibrous dysplasia are also indicated.

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

Acknowledgement

The authors would like to thank Mr. Abdulrahman N. A. Al Jurayyan for typing the manuscript and extend their thanks and appreciation for Mr. Ibrahim N. A. AlJurayyan for his help in preparing the manuscript.

References

1. Al Jurayyan NA Osman HA, Al Jurayyan ARN, Al Hakami AA Al Issa SDA Precocious Puberty in Children, An Overview. *Int. J Med Res Prof*; 2017; 3(1): 9-13
2. Blondell RD, Foster MB, Dave KC Disorders of Puberty *Am Fam Physician* 1999; 60(1):209-218
3. Dixon JR, Ahmed SF Precocious Puberty *J Clin Endocrinol Metab* 2007;17(9) : 343-348
4. Muir, A Precocious Puberty: Diagnosis and Management *Pediatrics in Review* 2006;27(10):373 – 381
5. Carel JC, Leger J Precocious Puberty *N Engl J Med* 2008;358;2366 – 2377
6. Kaplowitz P Precocious Puberty Update on Secular Trends, Definitions, Definitions and Treatment *Adv Pediatrics* 2004;51:37-62
7. Synovitz L, Chopak-Foss J Precocious Puberty: Pathology, related risk and support strategies *Open Journal of Preventive Medicine* 2013, 3(9):504-509
8. Eugster EA Peripheral Precocious Puberty: Causes and current management *Horm Res* 2007;71:64-67
9. Fahmy JL, Kaminsky CK, Kaufman F Nelson MD, Parisi MT The radiological approach to precocious puberty *Br. J Radiology* 2000;73:560 – 567
10. Faizah MZ, Zuhanis AH, Rahmah R, Raja AA, Wull, Dayang AA, Zulfigar MA Precocious Puberty in Children; A review of Imaging Findings *Biomed Imaging Interv J* 2012; 8(1) : e6.doi:10.2349//biig.8.i.e6
11. Bull RK, Edwards PD, Kemp PM Fry S, Hughes I.A. Bone Age Assessment: a large scale comparison of the Greenlich and Pyle and Tanner and white house methods *Arch Dis Child* 1999; 81;172-73
12. Anasti JN, Flack MR Froehlich et al Potential Novel Mechanism for Precocious Puberty in juvenile hypothyroidism *J Clin Endocrinol Metab* 1995;80:276-82
13. Castro – Magana M. Angulo M Canas A, et al Hypothalamic Pituitary gonadal axis in boys with primary Hypothyroidism and Macroorchidism *J Pediatrics* 1988; 112:397-402
14. Al Jurayyan NA Congenital Adrenal hyperplasia in Saudi Arabia; The biochemical characteristics *Int J Health Sci Res* 2015;5(5):98-102
15. Ferrito L, Cohellis G, Giobbi D Pannunzi CP, Lannilli A, Cherubini V. Peri[heral precocious puberty due to functioning adrenocortical tumor. *Description of two cases. J Pediatric Adolescent Gynecology* 2017;30(1):e1-e4
16. Chae HS, Rhee CH Precocious Pseudopuberty due to an autonomous ovarian follicular cyst: Case report with a review of literature *BMC Research Note* 2013;6(1):1-3
17. Battaglia C, Regnani G, Mancini F, Lughetti L, Venturoli S, Flamigni C. Pelvic ultrasonography and uterine artery color doppler and analysis in the diagnosis of female precocious puberty. *Ultrasound Obstetric Gynecology* 2002;19(4):386-391
18. Mobini M, Vakili R Vakili S McCune-Albright Syndrome A case report and literature review *Int J Pediatrics* 2014 2(2) : 153-156

How to cite this article:

Ahmed H. AlShaer. et al, 2017 Peripheral Precocious Puberty In Children: The Role of Radiologic Imaging. *Int J Recent Sci Res.* 8(1), pp. 15168-15170.