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*Case Report*

# Diagnosis and Evaluation of Central Precocious Puberty (CPP) in Paediatrics

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***Abstract***

*Central precocious puberty (CPP) is an abnormally early puberty characterized by biochemical and physical features. It is mainly seen in girls, with idiopathic cases, while approximately 50% of boys have identifiable causes. The diagnosis relies on clinical, biochemical, and radiographic features. Untreated CPP can lead to early epiphyseal fusion and compromise in adult height, making therapy the main goal. The gold-standard treatment for CPP is go-nadotropin-releasing hormone analogs (GnRHa), with various prepaarations available.*

*Further research is needed on the psychological aspects, optimal monitoring, and long-term effects of GnRHa treatment. Several potential therapeutic alternatives to GnRHa are currently under investigation.*

## Introduction

Central precocious puberty (CPP) is the premature activation of the hypothalamic–pituitary–gonadal (HPG) axis, leading to the development of secondary sexual characteristics. The cutoffs for CPP are 8 years of age for females and 9 years for males. The earliest clinical manifestation of central puberty in girls is breast development, followed by pubic hair. The pubertal growth spurt typically occurs during Tanner stage II–III, with the first menstrual period occurring at Tanner stage IV. In boys, the initial clinical sign is testicular enlargement, and the pubertal growth spurt occurs later than in girls.

The earliest known biochemical change during puberty is increased production of kisspeptin in the hypothalamus, which results in increased gonadotropin-releasing hormone (GnRH) release. This rise in kisspeptin is widely acknowledged as the seminal event that initiates HPG axis activation during puberty. Inhibition of the GnRH pulse generator decreases during sleep, resulting in an increase in nighttime luteinizing hormone (LH) pulse amplitude during early and mid-puberty. As puberty progresses, LH pulse amplitude increases during daytime hours, leading to an increase in estrogen and testosterone levels.

Patient Identification: A Female age /8 Mnth 4 Days, has been identified with Central precocious puberty.

**History**

The MRI brain review found a hypothalamic lesion in the hypothalamic floor, suggesting a hypothalamic hamartoma. A small, non-enhancing rounded area in the anterior pituitary was initially reported as microadenoma but later confirmed as normal. The pituitary dimensions were AP-4.67 mm, supero-inferior 5.5 mm, and transverse 9.05 mm, with a volume of 1.2 mm3. No seizures were observed, and no allergies were found.

**Examination**

The patient is stable with a weight of 7.94 kg and a height of 71 cm. The anterior fontanel is open and pulsatile, with no dysmorphic features. The skin is normal, with pallor present. The breasts have b/l buds and right-sided breast tissue. The cardiovascular system is normal, with no murmurs.

The abdomen is soft and there is no organomegaly. The genitalia have downy hair over the mons pubis but not on the labia minora, and the vaginal mucosa is pale and edematous. No neurodeficits are present.

**Final Assessment**

Central precocious puberty is indicated by a baseline LH >0.2 miIU/ml, Estradiol > 10pg/ml, uterine size of 3.5-4cm with volume >2 cc, and advanced skeletal age. The baby has abseline LH 16 mIU/ml, Estradiol -46 pg/ml, uterine volume of 2.2 ml, left ovary 1.3 cc with a follicle of 8mm, and a bone age between 2 to 2 years 6 months. The MRI brain shows a nodular lesion arising from the floor of the hypothalamus, likely a hamartoma. The most common cause of central precocious puberty (CPP) is congenital malformation of the central nervous system. Patients with CPP exhibit symptoms such as epileptic syndrome, progressive cognitive decline, and behavioral disorders. Indication to treat CPP in girls is age < 7 years, with rapidly increasing linear growth, advanced pubertal development, and compromised adult height potential at first visit.

Monthly triptorelin or Leuprolide depot at a dose of 3.75 mg can be used to suppress puberty in such cases. Monthly Leuprolide injection can be planned for this baby, and children will be monitored for clinical signs of pubertal suppression, growth velocity, and bone age. Attenders are informed about side effects, such as allergic reactions, withdrawal bleeding, and injection site abscess.

Medications include injection of Leuprolide 3.75 mg IM, cortisol, prolactin levels, and tonoferon drops 20 mg/ml 1 ml OD 1 hour before or 2 hours after feeds. The next injection is scheduled for 22/6/23.

## Conclusion

CPP is a common condition affecting girls and is linked to various conditions. Over a quarter of cases are familial, and genetic causes are being elucidated. Treatment with GnRHa offers the greatest potential benefit for younger patients. Multiple treatment options are available, with recent ones offering less frequent dosing and improved compliance. Adjunctive treatments are generally sparse in CPP, making them unsuitable for routine use.

Biochemical markers, bone age, and growth velocity should be monitored during treatment. GnRHa is safe and effective, and long-term data suggests satisfactory reproductive function after discontinuation. Further pharmacological and molecular genetic investigation and prospective studies will enhance knowledge and optimize treatment for children with CPP.

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