**Exam ticket №9**

1. General characteristics of puberty.

2. Hemorrhagic vasculitis in children. Etiology, pathogenesis, classification, clinical picture, diagnostics, differential diagnosis, treatment, prevention.

**Answers:**

**1.** Pubertal growth and physical development are a result of activation of the hypothalamic-pituitary-gonadal axis in late childhood. Before puberty, pituitary and gonadal hormone levels are low. At onset of puberty, the inhibition of gonadotropinreleasing hormone in the hypothalamus is removed, allowing pulsatile production and release of the gonadotropins, luteinizing hormone (LH), and follicle-stimulating hormone (FSH). In early to middle adolescence, pulse frequency and amplitude of LH and FSH secretion increase, stimulating the gonads to produce estrogen or testosterone. In females, FSH stimulates ovarian maturation, granulosa cell function, and is involved in corpus luteum formation and progesterone secretion. Initially, estradiol inhibits the release of LH and FSH. Eventually, estradiol becomes stimulatory, and the secretion of LH and FSH becomes cyclic. Estradiol levels progressively increase, resulting in maturation of the female genital tract and breast development. In males, LH stimulates the interstitial cells of the testes to produce testosterone. FSH stimulates the production of spermatocytes in the presence of testosterone. The testes also produce inhibin, a Sertoli cell protein that inhibits the secretion of FSH. During puberty, circulating testosterone levels increase more than 20-fold. Levels of testosterone correlate with the physical stages of puberty and the degree of skeletal maturation.

A teenager’s weight almost doubles in adolescence, and height increases by 15%–20%. During puberty, major organs double in size, except for lymphoid tissue, which decreases in mass. Before puberty, there is little difference in the muscular strength of boys and girls. The muscle mass and muscle strength both increase during puberty, with maximal strength lagging behind the increase in mass by many months. Boys attain greater strength and mass, and strength continues to increase into late puberty. Although motor coordination lags behind growth in stature and musculature, it continues to improve as strength increases.

The pubertal growth spurt begins nearly 2 years earlier in girls than in boys. Girls reach peak height velocity between ages 11½ and 12 years, and boys between ages 13½ and 14 years. Linear growth at peak velocity is 9.5 cm/y ± 1.5 cm in boys and 8.3 cm/y ± 1.2 cm in girls. Pubertal growth lasts about 2–4 years and continues longer in boys than in girls. By age 11 years in girls and age 12 years in boys, 83%–89% of ultimate height is attained. An additional 18–23 cm in females and 25–30 cm in males is achieved during late pubertal growth. Following menarche, height rarely increases more than 5–7.5 cm. In boys, the lean body mass increases from 80% to 85% to approximately 90% at maturity. Muscle mass doubles between 10 and 17 years. By contrast, in girls, the lean body mass decreases from approximately 80% of body weight in early puberty to approximately 75% at maturity.

Genital development. SMR staging includes age ranges of normal development and specific descriptions for each stage of pubic hair growth, penis, and testis development in boys, and breast maturation in girls. SMR 1 is prepuberty and SMR 5 is adult maturity. In SMR 2 the pubic hair is sparse, fine, nonpigmented, and downy; in SMR 3, the hair becomes pigmented and curly and increases in amount; and in SMR 4, the hair is adult in texture but limited in area. The appearance of pubic hair precedes axillary hair by more than 1 year. Male genital development begins with SMR 2 during which the testes become larger and the scrotal skin reddens and coarsens. In SMR 3, the penis lengthens; and in SMR 4, the penis enlarges in overall size and the scrotal skin becomes pigmented.

Female breast development follows a predictable sequence. Small, raised breast buds appear in SMR 2. In SMR 3, the breast and areolar tissue generally enlarge and become elevated. The areola and nipple form a separate mound from the breast in SMR 4, and in SMR 5 the areola assumes the same contour as the breast.

There is great variability in the timing and onset of puberty and growth, and psychosocial development does not always parallel physical changes. Chronologic age, therefore, may be a poor indicator of physiologic and psychosocial development. Skeletal maturation correlates well with growth and pubertal development.

Teenagers began entering puberty earlier in the last century because of better nutrition and socioeconomic conditions. Menarche may be delayed until age 16 years or may begin as early as age 10. Although the first measurable sign of puberty in girls is the beginning of the height spurt, the first conspicuous sign is usually the development of breast buds between 8 and 11 years. Although breast development usually precedes the growth of pubic hair, the sequence may be reversed. A common concern for girls at this time is whether the breasts will be of the right size and shape, especially because initial breast growth is often asymmetrical. The growth spurt starts at about age 9 years in girls and peaks at age 11½ years, usually at SMR 3–4 breast development and SMR 3 pubic hair development. The spurt usually ends by age 14 years. Girls who mature early will reach peak height velocity sooner and attain their final height earlier. Girls who mature late will attain a greater final height because of the longer period of growth before the growth spurt ends. Final height is related to skeletal age at onset of puberty as well as genetic factors. The height spurt correlates more closely with breast developmental stages than with pubic hair stages.

The first sign of puberty in the male, usually between ages 10 and 12 years, is scrotal and testicular growth. Pubic hair usually appears early in puberty but may do so any time between ages 10 and 15 years. The penis begins to grow significantly a year or so after the onset of testicular and pubic hair development, usually between ages 10 and 13½ years. The first ejaculation usually occurs about 1 year after initiation of testicular growth, but its timing is highly variable. About 90% of boys have this experience between ages 11 and 15 years. Gynecomastia, a hard nodule under the nipple, occurs in a majority of boys, with a peak incidence between ages 14 and 15 years. Gynecomastia usually disappears within 6 months to 2 years. The height spurt begins at age 11 years but increases rapidly between ages 12 and 13 years, with the peak height velocity reached at age 13½ years. The period of pubertal development lasts much longer in boys and may not be completed until age 18 years. The height velocity is higher in males (8–11 cm/y) than in females (6.5–9.5 cm/y). The development of axillary hair, deepening of the voice, and the development of chest hair in boys usually occur in mid-puberty, about 2 years after onset of growth of pubic hair. Facial and body hair begin to increase at age 16–17 years.

**2.** Henoch-Schonlein Purpura/ Henoch-Schonlein purpura (HSP) is one of the most

common vasculitic disorder of childhood and is characterized by the presence of a nonthrombocytopenic (and usually) palpable purpura, transient arthralgia (occasionally arthritis) and abdominal symptoms.

The illness begins with a purpuric rash more prominent over the extensor aspects of lower extremities and buttocks. It may be macular, maculopapular or even urticarial to begin with and can be difficult to diagnose in the first few days of the illness. Glomerulonephritis is seen in approximately one-third, but only 10% patients have azotemia or nephrotic range proteinuria. Clinically, it may manifest as isolated hematuria, hypertension or a nephritic/ nephrotic syndrome. This is the only longterm complication of HSP. Significant renal involvement is uncommon in children below 6 yr of age.

Gastrointestinal manifestations usually occur in the first 7-10 days of the illness. Affected children may be erroneously diagnosed as having a 'surgical abdomen' and even subjected to unnecessary surgery. Abdominal pain is usually intermittent, colicky and periumbilical. Vomiting occurs in about 60% of patients but hematemesis and malena are relatively less common. Most clinical features of HSP are self limiting and resolve in a few days. Rare manifestations include CNS vasculitis, coma, Guillain-Barre syndrome, pulmonary hemorrhage, carditis and orchitis.

Classification criteria for childhood HenochSchonlein purpura:

Palpable purpura in the presence of at least one of the following

4 features:

i. Diffuse abdominal pain

ii. Any biopsy showing predominant IgA deposition

iii. Arthritis or arthralgia

iv. Renal involvement (any hematuria and/ or proteinuria)

Laboratory Investigations: HSP is a clinical diagnosis and none of the laboratory features are pathognomonic. There may be a nonspecific increase in total serum IgA levels. Many children may have microscopic hematuria and proteinuria. Skin biopsy from the involved sites may show the characteristic leukocytoclastic vasculitis. On indirect immunofluorescence there are deposits of IgA and C3 in skin as well as renal biopsies. Ultrasound examinations may need to be repeated at frequent intervals for evolving abdominal findings.

Treatment. Management is generally supportive with maintenance of hydration and pain relief. Prednisolone (1-1.5 mg/kg/ day) is often given in children with gastrointestinal involvement and is usually continued for 2-3 weeks depending on the clinical response. There is, however, no clear evidence that steroids alter the natural course of the disease. HSP nephritis is a serious complication and can result in chronic renal failure if not managed appropriately. There is evidence to suggest that longterm treatment with prednisolone and azathioprine can result in prolonged remissions.

**Case 2. Feedinf task**

Prescribe feeding for 1 day for 3-months-old child. Birth weight 3000g. Artificial feeding.

**Answer:**

Present body weight is 3000+600+800+800=5200 g.

Volume of food for 1 day is 5200/6 =866 ml, volume for 1 feeding: 866/6 = 145ml

|  |  |  |
| --- | --- | --- |
| Time | **Food** | Volume, ml |
| 6 a.m. | Nutrilon 1 | 145 |
| 9.30 a.m. | Nutrilon 1 | 145 |
| 1 p.m. | Nutrilon 1 | 145 |
| 4. 30 p.m. | Nutrilon 1 | 145 |
| 8 p.m. | Nutrilon 1 | 145 |
| 11.30 p.m. | Nutrilon 1 | 145 |

**Mark** if all the calculations were made correctly and the feeding scheme was observed according to the “National Program for Optimizing the Nutrition of a First Year Baby” - 100 points, without taking into account the age of the child and there is no timely introduction of complementary foods, or vice versa - <70 points (%,), the error in the calculations is 70–79 points, there is no functional approach to the appointment of complementary foods or mixtures - 80–89 points.

**Case 2.**

A previously well 1-year-old infant has had a runny nose and has been sneezing and coughing for 2 days. Two other members of the family had similar symptoms. Four hours ago, his cough became much worse. On physical examination, he is in moderate respiratory distress with nasal flaring, hyperexpansion of the chest, and easily audible wheezing without rales.

1. The most likely diagnosis

2. The most likely agent responsible for the infant’s condition

**Answer**

Bronchiolitis is the most likely, although asthma, pertussis, and bronchopneumonia can present similarly. The family history of upper respiratory infections, the previous upper respiratory illness in the patient, and signs of intrathoracic airway obstruction make the diagnosis of bronchiolitis more likely. Viral croup, epiglottitis, and diphtheria are not reasonable choices because there are no signs of extrathoracic airway obstruction. The most likely cause of the illness is infection by respiratory syncytial virus, which causes outbreaks of bronchiolitis of varying severity, usually in the winter and spring. Other viruses, such as parainfluenza and the adenoviruses, have also been implicated in producing bronchiolitis. Treatment

is usually supportive in this usually self-limited condition.

**Analysis**

**CBC:** Er-4.2x1012/l, Hb-134 g / l, Ley-14.0x109/l, stab neutrophils -8%, segmented neutrophils -62%, lymph-24%, mon-3%, ESR-32 mm/hour.

**Answer:** leukocytosis with left shift, ESR increased. Signs of inflammation, bacterial infection