MINISTRY OF HEALTH OF UKRAINE
"Ukrainian Medical Dental Academy"

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on meeting the
department of Pediatric Surgery
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METHODICAL INSTRUCTIONS

FOR STUDENTS` SELF-WORK

WHILE PREPARING FOR PRACTICAL LESSONS

Educational discipline	Pediatric Surgery
module №3	Urgent Pediatric Surgery
Theme of the lesson	Purulent diseases of the bone and joints. Purulent diseases of the soft tissues.
Course	V
Faculty	foreign students preparation

POLTAVA 2020

1. The topic basis: the topic "Purulent diseases of the bone and joints, the soft tissues" is very important for future doctors in their professional activity, positively influences the students in their attitude to the future profession, forms professional skills and experience as well as taking as a principle the knowledge of the subject learnt.

2. The aims of the training course:

1. To master the forms of gematogenic osteomyelitis, complications and consequences causing abnormalities of the bone and joint system.
2. To recognize the basic clinical manifestations of septic arthritis (metaephyseal osteomyelitis) for babies for children above 2 and atypical forms.
3. To differentiate the acute forms of gematogenic osteomyelitis as manifestation of sepsis, grave sepsis, septic shock.
4. To interpret auxiliary methods of researches: USD, X-ray, CT, measuring of intraosseous pressure, cytological and bacteriological researches, biochemical indices, indices of haemodynamic.
5. To show the symptom of fluctuation, "floating patella" symptom, measuring of intraosseous pressure, taking of cytological and bacteriological material from a bone.
6. To identify the features of separate diseases of the bone and joint system, which are accompanied by enlargement of joints and their malfunction.
7. To analyse the cause-effect relationships of the origin of inflammatory diseases of bones and joints; ground and formulate a previous clinical diagnosis.
8. To offer the algorithm of the actions of the doctor at inflammation of bones and joints.
9. To interpret general principles of treatments of gematogenic osteomyelitis, which are accompanied by a destructive process in bones and joints, features of the course of generalized forms.
10. To master the list of purulent diseases of soft tissues characteristic for new-born ones, stages of the development of septic process.
11. To recognize the basic clinical manifestations of purulent diseases of skin, subcutaneous fat tissue and the like.
12. To differentiate the forms of diseases, stages of septic process.
13. To interpret the auxiliary methods of diagnostics: thermometry, USD, X-ray, blood, and urine tests, cytological and bacteriological research.
14. To describe symptoms of inflammation in new-born ones (fluctuation, inflammation of umbilicus, mammary gland etc).
15. To identify the state and form of the course of purulent diseases of soft tissues.
16. To analyze cause-effect relationships of origin of purulent diseases in new-born ones, development of their grave forms.
17. To offer the algorithm of action of the doctor at the simple and toxic forms of purulent diseases of soft tissues.
18. To interpret general principles of treatment of purulent diseases of soft tissues. To define the tactics at the simple and toxic forms of diseases.

3. Basic knowledge, skills, habits necessary for studying the subject (interdisciplinary integration).

Names of previous disciplines	Obtained skills
1. Department of Pharmacology	The use of pathogenetic and symptomatic therapy.

2. Faculty pediatrics	Identify and replace additional research methods, are necessary for diagnosing, evaluating the findings.
3. Surgical diseases, topographic anatomy . Operative surgery	Draw diagrammatically the joints and bones. Demonstrate the technique of performing puncture joints. Identify the main priorities of minimally invasive research methods.
4.Propedeutics of childhood diseases	To describe the medical history of sick children from purulent-inflammatory diseases of bones, joints and soft tissues.
5.Department of Physiotherapy	The use of physiotherapy
6. Department of orthopedics and traumatology	To be able to immobilize limbs

Thereotical questions for the lesson:

1. What are the peculiarities of blood circulation in segments of bones in new-born ones?
2. When does the forming of epiphysiss of long pipe bones finish?
3. What intraosseous pressure is considered to be normal?
4. What are the peculiarities of diagnostic puncture and measurings intraosseous pressure at children with suspicion on acute gematogenic osteomyelitis? How does the intraosseous pressure change at acute gematogenic osteomyelitis?.
5. Peculiarities of structure of long pipe bone in children.
6. Name the clinical forms of acute gematogenic osteomyelitis.
7. Present the tromboembolic theory of acute gematogenic osteomyelitis.
8. Why do new-born ones and children under 2 develop the metaephyseal form of osteomyelitis ?
9. Name the atypical forms of osteomyelitis.
10. What is the most frequent symptom of metaephyseal acute gematogenic osteomyelitis?
11. Peculiarities of the joints punction. How often do they process?
12. What is the surgical method of treatment of metaephyseal form of osteomyelitis ?
13. Peculiarities of immobilization and its term at children with metaephyseal osteomyelitis.
14. Name the complications of acute gematogenic osteomyelitis and give the terms of their development.
15. Terms of dispensary observation and possible consequences of osteomyelitis.
16. What does ambulatory supervision after the children with gematogenic osteomyelitis contains of?
17. When is the sanatorium-resort treatment recommended?
18. Name the most widespread operations at chronic osteomyelitis at children.
19. What is the basis of empiric approach to the setting of antibiotics?
20. Give the structure and main reasons of origin of purulent-septic diseases in new-born ones.
21. What anatomic and physiological peculiarities of structure of skin and subcutaneous fat tissue further the inflammatory process?

22. Name the clinical manifestations of necrotizing phlegmon of new-born ones depending on its form.
23. Medical tactic at necrotizing phlegmon of new-born ones.
24. Forms and clinical manifestations of omphalitis in new-born ones.
25. Differential diagnostics of catarrhal omphalitis and fistula.
26. Peculiarities of treatment of omphalitis depending on its form.
27. Complications and consequences of an omphalitis at a child.
28. When and why does the mastitis of new-born ones develop?
29. Peculiarities of surgery at mastitis of new-born ones.
30. Reasons of development of paraproctitis in new-born ones.
31. Peculiarities of surgery at paraproctitis depending on its form.
32. What are the basic directions of treatment of purulent-septic diseases of new-born ones?

4. Maintenance of the subject:

OSTEOMYELITIS

This disease occurs most often between 5 and 14 years of age and twice as frequently in boys as in girls. In infants under 2 years of age acute hematogenous osteomyelitis differs in many respects from that in older children.

ETIOLOGY AND PREDISPOSING FACTORS. The causative organism in the majority of instances is the hemolytic Staphylococcus aureus, though most of the other pathogenic bacteria may also be responsible. Primary lesions are often demonstrable and include furunculosis, impetigo, infected chickenpox and burns, and vaccinations.

PATHOIOGY. Osteomyelitis begins as a hematogenous abscess in the metaphysis, and then, if linterrupted, the abscess ruptures subperiosally and spreads along the shaft of the bone ider the periosteum. The infection then peneates to the bone marrow. The deep layer of the parated periosteum forms a shell of new bone ound the infected shaft. The pieces of dead bone e known as sequestra, and the new bone formed the periosteum as the involucrum. Sinuses may rm between the sequestra and the skin surface, the hip the metaphyseal abscess ruptures into e joint and creates a suppurative arthritis.

CLINICAL MANIFESTATIONS. The onset is ually abrupt, with fever, malaise, and pain with apply localized tenderness in the bone at the me-ohysis. Shortly thereafter swelling and redness er the affected bone may be present. These signs pear earlier in infants than in older children. ie patient is toxic and extremely weak and irritable.

When osteomyelitis follows an infection which has been treated with an antibacterial agent, the clinical course may be modified sufficiently so that the true nature of the lesion may not be suspected until it is well advanced. In addition, inadequate antibacterial therapy of an acute osteomyelitic infection may temporarily abolish the clinical manifestations, but permit the infection to continue in a suppressed state only to become evident days or weeks later.

DIAGNOSIS. There is a leukocytosis of 15,000 to 25,000 cells or more, and the blood culture is usually positive. Roentgenographic examination does not reveal the process for at least 5 days in small children; in older children this period may be as long as 8 to 10 days. At this time there is rarefaction of the involved area, and soon there is evidence of the formation of involucrum.

DIFFERENTIAL DIAGNOSIS. Rheumatic fever, leukemia, primary or metastatic neoplasm, sprain, cellulitis, erysipelas and scurvy are likely to require differentiation. The presence of great tox-icity and localized pain suggests osteomyelitis. Usually this is enough to distinguish the condition from rheumatic fever, but a history of involvement of other joints is indicative of the latter disease, as is the response to salicylates. Scurvy produces painful and tender swelling along the shaft of the bone, but roentgenograms of the long bones should be diagnostic. PROGNOSIS. The mortality rate from acuj pyogenic infections of the bones has decrease since the availability of specific antibacterial agents. The rate is lower in newborn infants than in older infants and children, as is the incidence of chronic and metastatic lesions. Both the course and prognosis depend on early institution of appropriate therapy and continuance of it for an adequate time.

TREATMENT. Like acute pyogenic arthritis osteomyelitis should be handled as a medical and orthopedic emergency. As soon as one or two specimens have been obtained for blood culture, intravenous antibiotic therapy is initiated. In children under 3 years of age either penicillin-resistant staphylococci or gram-negative organisms are! likely to be found, so that therapy should be initiated both with a penicillinase-resistant agent such as methicillin or nafcillin or clindamycin and with

Intravenous therapy is pntinued until acute systemic manifestations of pfection have subsided; oral therapy is thereafter paintained in full doses for 3 to 4 weeks.

Local treatment of choice for early osteomyelitis is immediate surgical drainage of the metaphysis, pough some clinicians illogically prefer to wait 24 to 48 hours to evaluate the response to antibiotic perapy. When the abscess has ruptured into the subperiosteal space, chronic osteomyelitis is the inevitable sequel. Watching and waiting in such a situation is attended with considerable risk.

ACUTE INFECTIOUS ARTHRITIS

This condition is most common in the first 6 months of life. It is usually preceded by an infection elsewhere in the body, often in the upper respiratory tract. The causative organism is usually one of the common pyogens, such as the staphylococcus, streptococcus, pneumococcus, or *H. influenzae* and, less commonly, the gonococcus, meningococcus, typhoid bacillus or one of the salmonella group of organisms. The shoulder, hip and other large joints are most commonly affected, but any joint may be involved. Pyogenic arthritis will result in rapid destruction of cartilage and ankylosis of the joint if diagnosis and treatment are delayed.

CLINICAL MANIFESTATIONS. The onset is sudden, with systemic symptoms of sepsis. Local swelling appears rapidly, with muscular rigidity and intense pain on motion of the joint, and, if untreated, is followed quickly by suppuration. When the hip is affected, it may become dislocated with astonishing rapidity.

DIFFERENTIAL DIAGNOSIS. Acute suppurative arthritis must be differentiated from *acute osteomyelitis.* In acute suppurative arthritis even slight motion of the joint is painful, whereas in osteomyelitis the joint may be moved without pain if done carefully. In suppurative arthritis there is ring tenderness around the joint; in osteomyelitis the tenderness is localized to the metaphysis. In the hip the differentiation cannot be made. The roentgenogram may be of no value in early diagnosis. *Rheumatic fever* rarely occurs in infancy and often involves more than one joint; a prompt response to salicylate therapy is suggestive of rheumatic fever. When an acute pyogenic infection of a joint is suspected, the joint should be aspirated and any material obtained cultured. A blood culture should also be obtained.

TREATMENT. The principle of treatment is immediate drainage of the joint. Emergency drainage can be obtained initially by paracentesis of the joint, but when, by smear or culture, the diagnosis of suppurative arthritis is established, prompt surgical drainage of the joint should be done. Appropriate antibiotic therapy is essential

Mastitis neonatorum.

Engorgement of the breasts is physiologic in newborn infants. Infection may be abetted by undue manipulation of the breasts and is manifest by redness, local heat, swelling and pain. Fever and other general symptoms may also be present. The prognosis is favorable unless septicemia develops. Prophylaxis consists in avoidance of manipulation or other trauma of the engorged breasts. Treatment includes systemic antibiotic therapy and hot compresses applied locally. If an abscess develops, it should be incised and drained. Scar formation after infection may distort the nipple and impair the secreting power of the mammary gland in a female in later life.

Omphalitis.

Inflammation in the umbilical region, which may be caused by any of the pyogenic bacteria, is especially serious because of the danger of hematogenous spread or extension to the liver or peritoneum. The general manifestations may be minimal even when septicemia or hepatitis has

resulted. Prevention of infection depends upon maintenance of a clean umbilical field. Daily baths or daily application of triple dye to the umbilical stump and surrounding skin may reduce the incidence of umbilical infection. *Treatment* includes prompt antibacterial therapy and, if there is abscess formation, surgical incision and drainage.

Perianal Abscess (paraproctitis)

Perianal abscess is a not so rare condition seen almost exclusively in infants less than two years of age. Most cases are seen in males' infants. The infant presents with a history of increasing irritability, fever, erythema and induration of the perianal skin. In a period of 48 to 72 hours the area becomes fluctuant. Oral antibiotics are ineffective in controlling the infectious process. It is theorized that a perianal abscess arises from a developmental anomaly in the deep crypts of Morgagni which trap bacterias initiating a cryptitis that proceed to a perianal abscess. This abscess may open or not to become later a fistula in ano. Gut derived organisms are isolated from most cases of perianal abscess. Most abscesses are located laterally equally divided between right and left. Perianal abscesses in children are best treated by incision, drainage and systemic antibiotics. A proportion of patients with perianal abscess later develop a fistula in ano. This fact has led some researchers to propose that primary treatment of perianal abscess in childhood involve a careful search for a coexisting fistula and treatment of this by fistulotomy. Long term recurrence is very rare. Recurrence should prompt a search for associated disorders such as Crohn's, immunodeficiency and autoimmune neutropenia.

5. Additional materials for the self-control

A. Clinical cases

Case 1. 2 days ago the mother of a 14-day infant noticed that he was uneasy and the temperature rose to 39^0C. During bathing the active movements of the right leg were absent. The examination results are: edema and hyperaemia of skin are noticed in the right hip joint area. During active movements in the joint the infant gets uneasy. What diagnosis have you made? What is to be done to verify the diagnosis?

Case 2. A month ago a 10 year-old girl was ill with a follicle quinsy. Yesterday evening pains appeared in the area of the right shoulder, the temperature of the body rose to $38,5^0$C, there was vomiting twice. She couldn't sleep at night, because of the pains. At the examination: in the area of the right shoulder was swelling, local hyperthermia, hyperemia, a venous picture is visible on the skin. During palpation and percussion there is sharp pain. The blood test showed some anaemia, ESR – 42 mm/hour, leucocytes were $12,0\times10^{9.}$ What diagnosis have you made? What tactics have you developed?

Case 3. You have examined a 4 year-old girl, who complains about pain in the area of the upper lip. At the examination the redness, and 1,5 cm infiltration with a necrotic bar in the center in the area of the upper lip were detected. The palpation causes pain. What diagnosis have you made? What are posssible complications? What tactics have you developed?

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