



Particulars of breastfeeding age in preterm child (case report)

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Abstract. Background. General physicians often encounter preterm infants and adverse sequelae of prematurity-related morbidities. Interruption of intrauterine development leads to considerable deficits in the internal organs structure and function. It can lead to endothelial dysfunction, hypertension, proteinuria and metabolic abnormalities that persist throughout life. Children born early or low birth weight (LBW) infants also have relatively increased risk for the development of kidney injury later in life. Often these infants have history of treatment at the intensive care unit due to hypoxic damage or inflammatory response that also affects kidneys necessitating the use of nephrotoxic medications. The treatment and diagnosis outcomes were applied to make a conclusion about clinical features of the preterm 7-month-old girl. The data were analyzed using PubMed/MEDLINE and Google Scholar databases. The aim is to summarize particulars of breastfeeding period in a LBW baby, providing a physician with practical information regarding organization of a follow-up. **Material and methods.** The baby was moderately preterm (32–33 weeks of gestation) with LBW (2100 g). Her mother was consulted regarding hypertension and threat of miscarriage during pregnancy. The child had renal borderline states in the newborn period. Apgar score was low, neonatal resuscitation and respiratory support by the continuous positive airway pressure were used. The newborn had poor regulation of body temperature, depended on environmental factors and prone to rapid heat loss, so she was nursed in incubator. A feeding tube was used despite poor sucking at the first days after delivery and breastfeeding was continued as soon as possible. Eventually, formula feeding was started. **Results.** Fever, vomiting, dehydration, loss of body weight and oliguria appeared in the 7-month-old baby after the upper respiratory tract infection. Examination showed the stigmas, neurodevelopmental delay, physical growth gap. Blood tests revealed anemia of the first stage and a rapid increase in the level of white blood cells with a left shift and electrolyte imbalance. The laboratory tests of primary and secondary hemostasis were normal. Physical, chemical and microscopic urine properties were changed according to results of urine test. The sonography revealed changes in renal tissue and thymic hyperplasia. The child was diagnosed with acute pyelonephritis and treated. **Conclusions.** Physicians should focus attention on the stigmas, neurodevelopmental delay, physical growth gap, life history, clinical signs and results of examination to make timely conclusion about child's general state. Kidney injury could be diagnosed in preterm LBW infants.

Keywords: kidney disorders; preterm infant; breastfeeding age

Introduction

Early childhood is interesting and important period of the people life. Physicians keep eye on the parameters of physical and psychomotor development, feeding, vaccination, prevention appearing of anemia's and rickets' symptoms also seizures [10, 18, 20]. Acute disorders of the toddlers' general state depend on infection triggers and im-

maturity of internal organs and immune system. On the one hand, modern perinatal technology and approaches to the prevention, diagnosis and treatment neonatal diseases could save the life and health of infants and toddlers, however, infant mortality rate concerns the wide pediatric society [1, 22]. So, mean reasons of the death are congenital diseases, unexpected infant's death, pathology of perinatal



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period of childhood, low term of gestation. Infectious diseases are threatened milestones of children's mortality too, like pneumonia, measles, malaria, diarrhea and more another [8].

European and American professional medical societies do their best in order to reduce children morbidity and mortality. General practice physicians are successful in pediatric. However, there is an issue of patience care, diagnosis and treatment of late (34–36 weeks' gestational age) and moderate (from 32–33 to 37 weeks' gestational age) preterm infants [17]. As rule, this group of infants is prone to various morbidities and adverse long-term consequences due to their anatomic-physiological particulars [2, 21].

Nearly 8 million children in developing countries die before they reach their fifth birthday, a lot of them during the first year of life. Renal diseases are important causes of morbidity and mortality in children. According to the data of references, falciparum malaria, obstetric mechanisms, and hemolytic uremic syndrome could be reason of acute kidney injury (AKI) in patients from the developing countries [16, 19]. The worldwide incidence of kidney disorders (KD) is poorly known due to underreporting, regional disparities, and differences in definition and case mix [4, 12, 13]. Preterm birth interrupts fetal nephrogenesis, leads to rise of chronic kidney disease susceptibility later in life [3, 11]. Critically ill newborns represent a high-risk population for developing AKI too. They are often treated with a combination of various therapeutic agents, each of them potentially inducing renal tissue injury [9]. Antibiotics, antifungal, and non-steroidal anti-inflammatory drugs can induce nephrotoxic damage of different segments of the nephron [6, 14].

Clinical management of toddlers with KD has required multidisciplinary collaboration and it is challenging due to the amount of care aspect. Case report could improve the practical skills and knowledge of family physicians in the part of diagnosis and treatment of the late and moderate preterm newborns.

Case summary

The 7-month-old girl was admitted to the hospital because of fever, vomiting, dehydration and loss of bodyweight and oliguria. The girl had secreted 200 ml of urine; the frequency of urination was 5 times per day. Two weeks before admission the mother saw in a child signs of a cough and rhinorrhea, but it has not influenced on the quality of the baby's life and disappeared soon. The girl has been well. On the evening before admission, her temperature was 39.2 °C and she began to vomit.

Data of obstetric history: the child was born in 32–33 weeks of gestation due to caesarian section from the first complicated pregnancy (hypertension and risk of the interruption of the pregnancy in early and later period), the estimation by Apgar scale was 7–8 points. Body weight after birth was 2100 g, body length was 48 cm. The reanimation was done for the child, that consisted in CPAP respiratory support and warming in the incubator. The baby had natural feeding due to a tube. The child was discharged from the Intensive Care a Maternity Hall on the 10th day with body

weight 2080 g. Feeding of the baby was artificial due to 6 months. Weaning was added in 5 months.

In the first month of life the baby had borderline states such as: the albuminuria (is caused by the increased permeability of the epithelium of glomeruli and canals of the kidneys), the urine acid kidney infarction (is shown by deposition of uric acid in the lumen of collective tubules and ducts papillary of kidneys, that were formed during the increased destruction of the nucleus of cells), the longer jaundice (due to 4 weeks). The physical development was estimated according to the Fenton chart due to 50 weeks of adjusted age of newborn. It was in the borders from 10 to 90 percentile [7].

The general condition of child was satisfactory due to 7-month-old.

Results

A lot of stigmas were found out at common examination of baby such as brachydactyly and syndactyly fingers of the hands and “sandals-like” deformation of feet. The impaired psychomotor development was documented. The infant was not able to sit well in a good position and crawl without assistance. However, examination of both upper and lower limbs was revealed normal power and reflexes.

At common examination of baby was found out:

- body weight was 6300 g, body length was 62 cm;
- the heart rate was 160 per minute, the breathing rate was 42 per minute;
- the temperature was 38.2 °C, the oxygen saturation was 95 % while the patient was breathing ambient air;
- abnormal levels of sodium, chloride and potassium in the blood.

Laboratory values obtained in the moment of admission are shown in Table 1.

The blood clotting by Lee-White and tests of primary hemostasis (platelets count, bleeding time by Duke) were normal.

According to data of the common blood test, the baby had anemia of the first degree and rapidly increasing of the level of white blood cells with the left shift of leukocyte formula. So, we could think about serious inflammatory reaction in the child and go on all necessary additional investigations.

The urine was negative for glucose; urine protein was 0.12 ‰, density — 1010, the sediment contained 0 to 2 red cells, 10 to 15 white cells, 2 to 3 polymorphic epithelial cells and 2 to 4 pus cylinders per low-power field. *Escherichia coli* and uric acid crystals (++) were found too.

During instrumental research was found out:

- QRS 0.08 s, QT 0.26 s, PQ 0.11 s for data of ECG;
- sonography of brain and chest X-ray were without pathology;
- sonography of kidneys showed: the size of left kidney was increased and a rise acoustic transparency of the tissue was determined;
- sonography of urinary bladder was normal for the age and hyperplasia of the thymus was determined too.

All investigations were started after obtaining the consent of the patient's parents to participate in the study in compliance with the provisions of the UN Convention on

the Child Rights. The research materials do not contradict the International Code of Medical Ethics (1983) and the laws of Ukraine, meet the basic bioethical norms of the Helsinki Declaration, adopted by the General Assembly of the World Medical Association, the Council of Europe Convention on Human Rights and Biomedicine (1977).

According to the results of patient exam (fever, vomiting, oliguria, inflammatory reaction of the blood, leukocyturia, bacteriuria, structural changes in the kidney) acute urine tract infection was diagnosed in the child. It was kidney injury like acute pyelonephritis.

According to the guideline of acute urine tract infection treatment in the children (guidelines.moz.gov.ua), cephalosporin of III generation was prescribed in the age dose due to 7 days and also symptomatic treatment of the fever. The toddler was discharged with the satisfactory condition and her physician should look after premature infant during the first year of baby’s life.

Discussion

This child has a functional immaturity, and her systems of internal organs are developed insufficiently for maintenance of their normal existence in the extra uterine conditions. Also, mechanisms of perinatal technologies (such as the prevention of respiratory distress syndrome with cold injury,

particulars of respiratory support after the birth, the natural feeding, skin to skin contact with mother) have influenced on the long-term consequences, adaptation and restoration vital functions of the toddler. Complex of mother’s care has the important role in the treatment of preterm newborn too. General condition of the preterm child depends on immunodeficiency, when preterm baby doesn’t produce antibodies and T-lymphocytes enough, which carry out the cellular immunity and are formed in the thymus just. That is why, viruses and bacteria are caused illnesses of preterm infants. So, we can say about an ascending type of infecting of urine system in our case. On the other hand, the morphological dysfunction of organs leads to increase of frequency tissue’s injury [5, 15]. The stigmas belong to anatomic-physiological dysfunction and promote complications developing. Moreover, the clinical signs of different preterm children’s diseases are not specific. In addition, these toddlers own of slowly physical and psychomotor development in the first year of life. We use the “UK-WHO growth charts — 0–4 years” for the estimation of the optimal growth of preterm born toddler. Taking into account the results of an estimation of physical development we believe that growth rate was compromised by the acute infection disease.

Conclusions

This case report has highlighted the importance of early recognition of the kidney complication of upper respiratory tract infection in preterm children of breastfeeding age. The changes in organs and associating systems with development of kidney disorders in the preterm infants have been displayed. The important clinical determinants that can be used for diagnostic search of family physician have been determined. The most important the clinical determinants in premature infants of the breastfeeding age, that can say about disease are the stigmas, impaired physical growth and delay of psychomotor development, the borderline states in neonatal period of the life, anemia, neutrophilia, the left shift of leukocyte formula, proteinuria, detection of bacteria, leukocyturia and leukocytic cylinders in the urinary sediment, the change of kidneys sizes and acoustic transparency during ultrasound investigation.

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Особливості грудного періоду в передчасно народжених дітей (клінічний випадок)

Резюме. Актуальність. Лікарі загального профілю часто стикаються з передчасно народженими дітьми та несприятливими наслідками захворювань, пов'язаних із недоношеністю. Переривання внутрішньоутробного розвитку викликає значущі порушення будови й функції внутрішніх органів, що може призвести до ендотеліальної дисфункції, гіпертензії, протеїнурії та метаболічних аномалій, які зберігаються протягом усього життя. Діти, народжені передчасно, або не-

мовлята з низькою масою тіла при народженні також мають відносно підвищений ризик розвитку пошкодження нирок у майбутньому. Часто ці немовлята лікуються у відділеннях інтенсивної терапії через гіпоксичне ураження або реакцію запалення, це також впливає на нирки, що змушує використовувати нефротоксичні препарати. Результати лікування й діагностики були застосовані, щоб зробити висновок про клінічні особливості недоношеної 7-місячної дівчинки. Дані

проаналізовані за допомогою баз даних PubMed/MEDLINE та Google Scholar. **Метою** статті є узагальнення особливостей періоду грудного віку в дитини з низькою масою тіла, надання лікарям практичної інформації щодо організації подальшого спостереження. **Матеріали та методи.** Дитина народилася помірно передчасно (32–33 тижні вагітності) з низькою масою тіла (2100 г). Породілля була консультована з приводу гіпертензії та загрози переривання вагітності. У дитини в неонатальному періоді діагностовано транзиторні стани нирок. Оцінка за шкалою Апгар була низькою, проводилися реанімаційні заходи з респіраторною підтримкою з постійним позитивним тиском на видиху. Новонароджена дитина погано утримувала тепло, залежала від температури навколишнього середовища та була схильною до тепловтрати, тому виходжувалася в кювезі. Було налагоджене вигодовування через зонд, незважаючи на погане смоктання в перші дні після пологів, і при першій можливості грудне вигодовування продовжили. Згодом дитину почали годувати сумішшю. **Результати.** Після перенесеної інфекції верхніх дихальних шляхів у 7-місячної

дитини з'явилися лихоманка, блювання, зневоднення, втрата маси тіла та олігурія. При обстеженні виявлені стигми, затримка нервового розвитку, відставання у фізичному розвитку. Аналіз крові встановив анемію I стадії та стрімке підвищення рівня лейкоцитів зі зсувом лейкоцитарної формули вліво й електролітними порушеннями. Лабораторні показники первинного та вторинного гемостазу в нормі. Фізичні, хімічні, а також мікроскопічні властивості сечі були змінені відповідно до результатів її аналізу. При ультразвуковому дослідженні виявлені зміни ниркової тканини та гіперплазія тимуса. У дитини діагностовано гострий пієлонефрит та проведено лікування. **Висновки.** Лікарі повинні звернути увагу на стигми, затримку нервового розвитку, відставання у фізичному розвитку, дані анамнезу життя, клінічні ознаки та результати обстеження, щоб своєчасно зробити висновок про загальний стан дитини. У передчасно народжених із низькою масою тіла може бути діагностовано пошкодження нирок.

Ключові слова: ниркові розлади; недоношена дитина; грудний вік