The analysis demonstrated an insufficient level of continuity between pediatric and adult healthcare services, leading to the loss of dispensary follow-up after adolescents reached the age threshold. At the same time, adolescents rarely sought preventive consultations, indicating the need to strengthen preventive healthcare activities [3, 5].

Thus, adolescence is characterized by a high prevalence of functional, chronic, and psycho-emotional disorders. Psychosocial factors significantly influence adolescent health and require a comprehensive medical approach [1, 4]. Insufficient continuity between pediatric and adult healthcare services remains an important issue in adolescent medicine.

Therefore, optimization of medical care for adolescents should include a multidisciplinary approach, strengthening preventive measures, and fostering a responsible attitude toward personal health [2, 5].

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MIRROR SYNDROME IN OBSTETRICS: WHEN MATERNAL PATHOLOGY REFLECTS FETAL DISEASE

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Abstract. Mirror syndrome, also known as Ballantyne syndrome, is a rare complication of pregnancy characterized by the combination of generalized fetal hydrops, placentomegaly, and a systemic pathological response in the maternal organism. The clinical presentation in the pregnant woman reflects the severe condition

of the fetus, which is a defining feature of this syndrome. This paper examines the etiological factors and pathogenetic mechanisms underlying the development of mirror syndrome, its clinical manifestations, diagnostic criteria, and principles of pregnancy management, and also provides a comparative analysis with preeclampsia as the pregnancy complication with the most similar clinical features.

Keywords. Mirror syndrome, fetal hydrops, placentomegaly, preeclampsia, pregnancy complications, differential diagnosis, pathology, obstetrics.

Introduction. Pregnancy is a complex physiological process accompanied by profound changes in all systems of the female body. Most of these changes are adaptive in nature and are aimed at ensuring normal fetal growth and development. However, in the presence of pathological factors related to the fetus or the placenta, compensatory mechanisms may become exhausted, leading to the development of severe complications for both the mother and the fetus.

One of the least studied yet clinically significant conditions is mirror syndrome (Ballantyne syndrome), which is characterized by a peculiar “reflection” of the severe fetal condition in the maternal organism. Classically, the syndrome presents as a triad comprising generalized fetal hydrops, placentomegaly, and a systemic pathological maternal response manifested by edema, hemodilution, and hemodynamic disturbances [1, 2, 3, 4].

Purpose and objectives of the study. To perform a systematic analysis of the clinical and pathogenetic features of mirror syndrome in pregnant women, to identify its key differences from preeclampsia, acute maternal heart failure, nephrotic syndrome, and anemia of other origins, and to evaluate possible pregnancy management strategies aimed at improving maternal and perinatal outcomes. The objectives of the study include determining the etiological factors and pathogenesis of mirror syndrome, analyzing maternal and fetal clinical manifestations, comparing mirror syndrome with other pathological conditions, reviewing current diagnostic and pregnancy management approaches, and assessing prognostic factors as well as the potential for regression of maternal symptoms after the completion of pregnancy.

The results of the study and their discussion. Despite the fact that mirror syndrome was first described at the end of the 19th century, it remains a rare diagnosis in clinical practice. [1, 2, 5, 6, 7] The main reason for this is the nonspecific nature of maternal symptoms and their significant clinical similarity to preeclampsia, one of the most common hypertensive complications of pregnancy. Misdiagnosis may result in inappropriate pregnancy management and a worsening of prognosis [3, 8].

Given the expanding capabilities of prenatal diagnostics and intrauterine therapy, the issue of timely recognition of mirror syndrome has become particularly relevant.

Etiology of Mirror Syndrome. Mirror syndrome is not an independent disease but develops secondarily as a consequence of severe fetal pathology accompanied by hydrops fetalis. [7] Contemporary literature distinguishes immune and non–immune causes of fetal hydrops, with non–immune forms predominating in the structure of mirror syndrome (approximately 53.5%) [1, 8, 9, 10, 11, 12, 13].

The main etiological factors include:

- congenital heart defects and fetal cardiomyopathies [2, 10, 13];
- severe fetal anemia (resulting from fetomaternal hemorrhage, infections, or genetic disorders) [1, 2, 13];
- chromosomal abnormalities (Turner syndrome, trisomies) [10, 11, 14];
- intrauterine infections (parvovirus B19, cytomegalovirus) [1, 3, 14];
- disorders of the fetal lymphatic system [7];
- fetal or placental tumors [1, 10];
- multiple pregnancy complicated by twin–to–twin transfusion syndrome [12, 13].

All these conditions lead to the development of fetal cardiovascular failure and accumulation of fluid in serous cavities, which serves as the triggering mechanism for subsequent placental and maternal changes.

Pathogenesis of Mirror Syndrome. The pathogenesis of mirror syndrome is multifactorial and involves close interaction between the fetus, placenta, and maternal organism. Fetal hydrops results in impaired fetoplacental circulation, leading to compensatory placental hypertrophy and edema.

Placentomegaly is accompanied by increased vascular permeability, fluid retention and reduced efficiency of oxygen and nutrient transport [14]. In response to placental dysfunction, mechanisms of sodium and water retention are activated in the maternal organism, resulting in an increased circulating plasma volume. In contrast to preeclampsia, where vascular spasm and hemoconcentration predominate, mirror syndrome is characterized by hemodilution, which represents a key laboratory feature of this condition [5, 6, 14]. It is believed that an imbalance between angiogenic and anti–angiogenic factors plays an important role in the development of maternal manifestations, similar to that observed in preeclampsia, but with an opposite final effect [6, 8].

Clinical manifestations in the mother. The clinical picture in the mother develops gradually and often correlates with the progression of fetal hydrops. The most characteristic symptoms include rapid weight gain [5, 6, 15]; generalized edema [1, 3, 13]; dyspnea [4, 13]; sensation of heaviness, weakness, and decreased tolerance to physical exertion [2]; proteinuria [1, 5] and hypertension [2, 6].

Laboratory findings demonstrate decreased hemoglobin levels [5], reduced hematocrit [6], proteinuria [1, 2, 6, 13]

Clinical manifestations in the fetus. In the fetus, mirror syndrome is almost always associated with an unfavorable prognosis. [4, 13] Ultrasound findings include ascites, pleural or pericardial effusion, subcutaneous tissue edema, polyhydramnios and placentomegaly. [3, 4, 11, 14] The severity of fetal hydrops directly correlates with the severity of maternal manifestations, which underlies the phenomenon of “mirror” reflection of the pathology.

Diagnosis is based on a comprehensive assessment of the condition of the mother, fetus, and placenta. Ultrasound examination is the key diagnostic method, allowing simultaneous detection of fetal hydrops and placentomegaly. [8, 11]

Differential diagnosis must include preeclampsia, acute maternal heart failure, nephrotic syndrome and anemia of other etiologies.

Table 1. Differentiation of Mirror syndrome from other conditions accompanied by edema in pregnant women.

Criteria	Mirror syndrome	Preeclamp-sia	HELLP syndrome	Acute heart failure	Nephrotic syndrome
Pathoge-netic basis	Secondary maternal reaction to fetal hydrops and placenta-megaly	Primary placental ischemia and endothelial dysfunction	Severe form of preeclamp-sia with systemic involvement	Decom-pencation of cardiac function	Glomeru-lar damage
Onset	Sudden, at any gestation-nal age	After 20 weeks	Predomi-nantly III trimester	Acute or subacute	Gradual
Blood pressure	Normal or mildly ↑	Persistently ↑	Markedly ↑ or labile	Often normal or ↓	Often normal
Edema	Generalized, massive	Moderate or significant	May be present, not leading	Dependent, with signs of congestion	Marked, anasarca
Dyspnea	Common	Possible	Possible	Leading symptom	Possible
Hemo-globin	↓ hemodilution	↑ or N	N or ↓	N	N or ↓
Platelets	N	N or ↓	Markedly ↓	N	N
ALT/ AST	N or mildly ↑	May ↑	Markedly ↑	N	N
Proteinu-ria	May be present	Significant	Significant	Possible	Massive
Fetal condi-tion	Generalized hydrops	Fetal growth restriction without hydrops	Fetal distress	Usually without hydrops	Usually without hydrops
Placenta	Placentome-galy	Ischemic changes	Same as preeclampsia	No specific changes	No specific changes
Postpar-tum course	Rapid regression of symptoms	Gradual improve-ment	Slow, risk of complicati-ons	Depends of treatment	Gradual
Key distingu-ishing feature	«Mirroring» of fetal condition	Hyperten-sion+protei-nuria	Triad: hemo-lysis, ↑ liver enzymes, ↓ platelets	Cardiac symptoms	Massive proteinuria

Data generated by author

Mirror syndrome should be primarily suspected when in a pregnant woman:

- massive generalized edema [2, 3, 5, 12]
- hemodilution rather than hemoconcentration is detected [5]
- fetal hydrops is obligatory present [1, 3, 8, 10, 12]
- maternal symptoms rapidly regress after fetal treatment or termination of pregnancy [8, 12]

Thus, mirror syndrome occupies a distinct place among pregnancy–related pathological conditions accompanied by edema and systemic disturbances. Unlike preeclampsia, HELLP syndrome, cardiac or renal pathology, it represents a secondary

phenomenon directly associated with severe fetal compromise, which determines the uniqueness of its clinical presentation and course.

Management strategy is determined by the underlying cause of fetal hydrops. In current clinical practice, the following approaches are possible: intrauterine blood transfusions, drainage of fetal serous cavities, treatment of intrauterine infections and premature birth in case of threat to the life of the mother. [8, 12]

Successful elimination of the cause of fetal hydrops may result in complete regression of maternal symptoms, which is a characteristic feature of mirror syndrome. [7, 10, 12]

Prognosis. With timely diagnosis, the maternal prognosis is favorable. In contrast, the fetal prognosis largely depends on the etiology of hydrops and the feasibility of intrauterine treatment. [1, 2, 5, 7, 10]

Conclusions. Mirror syndrome is a rare pregnancy complication that develops as a secondary systemic maternal response to severe fetal pathology, the obligatory component of which is generalized fetal hydrops. A central role in its pathogenesis is played by dysfunction of the fetoplacental unit and the development of placentomegaly. The key pathophysiological feature of mirror syndrome is hemodilution, which fundamentally distinguishes it from preeclampsia and other hypertensive disorders of pregnancy, where hemoconcentration is typical. This feature has important diagnostic significance.

Maternal clinical manifestations reflect the severity of fetal condition, forming the phenomenon of "mirror reflection." Massive generalized edema, rapid weight gain, and dyspnea in the absence of persistent arterial hypertension should raise suspicion of mirror syndrome. The presence of generalized fetal hydrops is an essential prerequisite for the development of mirror syndrome, allowing clear differentiation from preeclampsia, HELLP syndrome, and maternal cardiac or renal pathology. Differential diagnosis of mirror syndrome should be comprehensive and based on a combination of clinical, laboratory, and ultrasound findings, taking into account the dynamic changes in maternal and fetal condition.

Pregnancy management is determined by the etiology of fetal hydrops. When intrauterine treatment is feasible, elimination of the underlying cause may lead to regression of maternal symptoms; in cases of maternal life–threatening conditions, preterm delivery is indicated.

The maternal prognosis is generally favorable with timely diagnosis, whereas perinatal outcomes largely depend on the cause of hydrops and gestational age. Increasing clinicians' awareness of mirror syndrome is essential, as early recognition of this condition helps avoid diagnostic errors and optimize pregnancy management.

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АКУШЕРСЬКІ УСКЛАДНЕННЯ ПРИ ОЖИРІННІ ТА МЕТАБОЛІЧНОМУ СИНДРОМІ У ВАГІТНИХ (ОГЛЯД ЛІТЕРАТУРИ)

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Анотація

Ожиріння та метаболічний синдром набули характеру глобальної пандемії та становлять серйозну загрозу для репродуктивного здоров'я жінок. Зростання поширеності цих станів серед жінок репродуктивного віку зумовлює значне збільшення частоти акушерських ускладнень, несприятливих перинатальних наслідків та довгострокових метаболічних порушень у матері й дитини. Метою даного огляду є систематизація сучасних даних щодо впливу ожиріння та метаболічного синдрому на перебіг вагітності, розвиток акушерських ускладнень і неонатальних наслідків. Аналіз літературних джерел свідчить, що надлишкова маса тіла та інсулінорезистентність асоціюються з підвищеним ризиком гестаційного цукрового діабету, прееклампсії, передчасних пологів, макросомії плода, дистоції плечиків, оперативного розродження та післяпологових інфекційних ускладнень[1-6,10]. Комплексний підхід до ведення вагітних із ожирінням і метаболічним синдромом, що включає корекцію способу життя, дієтотерапію та мультидисциплінарне спостереження, дозволяє знизити частоту ускладнень та покращити материнські й перинатальні результати.

Ключові слова: ожиріння, метаболічний синдром, вагітність, акушерські ускладнення, перинатальні наслідки, інсулінорезистентність.