Pregnancy-related lumbopelvic pain: classification and diagnostics according to European guidelines and a review of literature

Ból lędźwiowo-miedniczny w ciąży: klasyfikacja i diagnostyka w świetle europejskich wytycznych i przegląd piśmiennictwa

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Abstract

Introduction: Lumbopelvic pain associated with pregnancy may originate from the lumbar spine, the pelvic girdle or may be mixed. According to European guidelines, individual subtypes of pain require different procedures, for which a detailed differential diagnosis is necessary. These ailments arouse a lot of controversy.

Aim: The aim of the work was to present the current state of knowledge on the aforementioned ailments, including European guidelines and the latest trends in foreign literature.

Results: The diagnosis of lumbopelvic pain, with particular emphasis on the pathophysiology and methods of differentiation of both pain syndromes, was discussed. Lumbar spine pain is mainly related to the mechanical load caused by a pregnant uterus. In the case of pelvic girdle pain, the main cause is the disorder of optimal stability, which depends on the correct mechanisms of force and form closure. Pelvic girdle pain is characterized by other clinical symptoms and risk factors, it also often remains after pregnancy, having negative impact on the daily functioning of a woman even years after giving birth. Depending on the location (one or both sacroiliac joints, pubic symphysis), several types of this pain syndrome are distinguished. The worst prognosis is pelvic pain associated with the involvement of all three joints at the same time. Until now, this term has not been more widely used in the Polish-language literature.

Conclusions: The complexity of chronic pain syndromes, in which the discomforts of the pregnancy period may develop, entails the necessity of early identification and deliberate action. Knowledge of the etiopathogenesis of these ailments is a prerequisite for therapeutic success. Introduction of terminology popular in foreign literature will improve treatment of these diseases, adapting it to current standards and will also enable better exchange of experience between professionals.

Słowa kluczowe
ból obręczy miednicznej, ból odcinka lędźwiowego, ciąży

Streszczenie

Wstęp: Związany z ciążą ból lędźwiowo-miedniczny może pochodzić z kręgosłupa lędźwiowego, obręczy miednicznej lub może to być ból mieszany. Zgodnie z europejskimi wytycznymi poszczególne podtypy bólu wymagają odmiennego postępowania, do którego konieczne jest ich szczegółowe diagnozowanie różnicowe. Dolegliwości te budzą wiele kontrowersji.

Cel: Celem pracy było przedstawienie aktualnego stanu wiedzy na temat omawianych dolegliwości z uwzględnieniem europejskich wytycznych i najnowszych tendencji w zagranicznym piśmiennictwie.

 Wyniki: Omówiono diagnostykę bólu odcinka lędźwiowego i bólu obręczy miednicznej, ze szczególnym uwzględnieniem patofizjologii i metod różnicowania obu zespołów bólowych. Ból odcinka lędźwiowego kręgosłupa związany jest głównie z obciążeniem mechanicznym powodowanym przez ciężar macicy. W przypadku bólu obręczy miednicznej za główną przyczynę uznaje się zaburzenie optymalnej stabilności, która jest zależna od prawidłowych mechanizmów ryglowania siłowego.
INTRODUCTION

Pregnancy-related lumbopelvic pain (LPT) is located in the area from the twelfth rib to the lower edges of the gluteal folds, with possible referred pain to the lower limb(s)1-3. In studies on pregnancy ailments, it is used as a collective term describing pelvic and lumbar spine pain in the absence of differentiation or the simultaneous occurrence of both4-6. LPP in literature is used interchangeably with the term “low back pain” (LBP). In this article, the understanding of the term LBP is narrower and refers to lumbar pain (LP) in accordance with its use by other authors1,4-6.

In most recent reports on LPP in lead with European guidelines7, attention is drawn to the need to distinguish and differently consider the two main subtypes - lumbar pain (LP) and pelvic girdle pain (PGP). The main cause is higher pain in the case of PGP and limitation in functioning8,9. In addition, LP and PGP differ in clinical symptoms and risk factors, hence, another argument for their separate treatment10. The recommended treatment procedure is also different7,11. Lower muscle endurance can be observed in PGP patients, whereas in patients with LP, it is within the norm12. PGP is more likely than an individual LP occurrence to remain after pregnancy, hindering daily activities13. Women reporting PGP are less active during pregnancy and experience a greater number of comorbidities and depression14,15. These complaints concern many women during pregnancy, negatively affecting their professional life, daily activities and sleep16. The clinical image is very diverse — not only individually, but also in time. LPP usually appears around the 18th week of pregnancy, however, the most intense pain occurs between the 24th and the 36th weeks. It may also appear during the first trimester, as well as delayed up to 3 weeks after delivery17.

EPIDEMIOLOGY OF LUMBAR-PELVIC PAIN DURING PREGNANCY

The average incidence of LPP (of any kind) in pregnant women is estimated at 24-90%6,7, depending on the adopted classification, diagnosis, location of pain, types of tests and the number of study groups. In the majority of available studies on LPP epidemiology, there is no differentiation between PGP and LP14. Therefore, it is difficult to accurately determine the prevalence of isolated LP and PGP in pregnant women. Different authors report on the occurrence of LP among pregnant women on average from 7% to 33%6,7,10,13,44, and even up to 71% at the end of pregnancy16. According to European guidelines, PGP is isolated in approximately 20% of women7. However, various values can be found in the literature due to the adoption of various diagnostic criteria. The occurrence of specific PGP associated with trauma during delivery is estimated at about 1 in 300-30,000 deliveries41.

For most women suffering from PGP during pregnancy, this pain spontaneously dissipates within a short time after delivery. However, 7% report severe discomfort due to persistent pain lasting many years2. The type of PGP associated with the involvement of all three joints has the worst prognosis: 21% of women report ailments for 2 years after delivery43.

ETIOPATHOGENESIS OF LUMBAR AND PELVIC PAIN DURING PREGNANCY

Lumbar pain

Risk factors for the onset of LP are, among others, ailments which occurred during previous pregnancies, physically demanding work or a sedentary lifestyle7,10,11. The probable cause of this discomfort is the mechanical stress caused by a pregnant uterus. The overall centre of gravity moves forward, which increases the load on the lumbar section of the spine6. Abdominal muscles are stretched and weakened, which forces additional muscle work15. During pregnancy, the woman’s body mass increases by about 20%, which forces the joints to increase by up to 100%6. This axial load can lead to compression of the intervertebral discs and consequently, to LP. Excessive compression may contribute to the dislocation of the nucleus pulpus and a decrease in body height16. Nevertheless, radiculopathy or horse-tail syndrome caused by pregnancy-related changes are extremely rare6. The feeling of discomfort is significantly influenced by loosening of the pelvic girdle joints and possible pressure of the blood vessels. For some pregnant women, pain appears in the first trimester, when the cause cannot be mechanical stress. In such situations, the role of hormonal changes as a factor favouring the development of LP is emphasized.

Pelvic girdle pain

Pelvic girdle pain is associated mainly with pregnancy, but may also occur in the case of trauma, rheumatoid arthritis, AS or osteoarthritis of the
Pain is experienced between the posterior iliac crest, below the upper back iliac spine and the lower edge of the gluteal folds, mainly in the area of the sacroiliac joints. Pain may be non-dermatomally referred to the back of the thigh or even the lower leg. It may also appear at the same time (or in isolated form) as pubic symphysis pain. Other areas often reported as painful are groins and around the coccygeal bone. The occurrence of PGP is associated with difficulties in maintaining a standing position, sitting and restricts free walking. According to European guidelines, the diagnosis can be made after exclusion of causes from the spine. This pain should be confirmed during provocative clinical trials.

PGP symptoms may appear during the first trimester of pregnancy, as well as at subsequent periods, during or after delivery in the postpartum period. The factors influencing PGP occurrence include hormonal changes, genetic and biomechanical factors, trauma, metabolic changes, motor control disorders and loading of ligament structures. Although unequivocal reasons are still unknown, hormonal changes and the lack of optimal stability (as a consequence of disturbances in motor control and/or poor motor patterns) are factors that are considered crucial in the development of PGP.

European guidelines include the definition of optimal stability as the effective accommodation of joints to individual loads through proper compression as a function of gravity, and the coordinated work of muscles and ligaments in order to obtain an effective joint reaction force during changing conditions. Optimal stability depends on adequate force closure and form closure, motor control and emotions. The force closure mechanism consists of compressive forces necessary to stabilize the sacral-hip joints that fit together, which are responsible for the form closure mechanism. If there is muscle dysfunction and inadequate tension of the ligaments, the compression of the sacroiliac joint is lower. With such a lack of dynamic pelvic stability, optimal transmission of force between the body and lower limbs is impaired.

The main subject of research on PGP etiology is disrupted force closure through inadequate operation of the myofascial trunk structures. Appropriate protection of the sacroiliac joint by means of a force closure strategy and sacral-bone nutation is necessary for the effective transfer of loads to the lower limbs. Significant reduction in the strength of the transverse abdominal muscle, the internal oblique abdominal muscle, the pelvic floor and multifidus muscles along with inadequate coordination of all muscles in the lumbo-sacral spine area are very often observed in PGP patients.

The moment of pain occurrence is important and should be taken into account during diagnostics. PGP that appears in the first trimester of pregnancy will most likely be associated with hormonal changes. If pain occurs in the second and third trimesters of pregnancy, stretching of the abdominal muscles and changes in the position of the body's centre of gravity are probably the main cause of the muscle disorders. Reduced operation of the force closure strategy can lead to neuromuscular compensations. Lee et al. described the two most common compensation strategies: tightening the butt-gripping area and chest-gripping.

The strategy of gripping the gluteal region is associated with excessive muscle activation of the pelvic girdle on the dorsal side. In the case of the chest, the abdominal external oblique muscle is compensatively overactive to the insufficient abdominal transverse muscle activity. Such strategies may lead to an increase in shear forces in the sacroiliac joints, which may be responsible for the development of pain.

Other authors also reported significant impact of muscle dysfunction (in particular on the deficit of the extensor back endurance and hip extensor strength) on the development of PGP and the risk of affecting the development of chronic dysfunction, lasting for a long time after delivery. Additional loosening of the ligaments together with the joint capsules leads to deficits in the force closure mechanism and, as a consequence, to pain. Muscle dysfunction, as one of these three components can be quite quickly and easily diagnosed and subjected to appropriate therapeutic treatment.

There is also a muscle hypothesis regarding the formation of pain around the pubic symphysis. The pelvis during pregnancy is firmly stiffened and pulled up in the back part, and the frontal iliac spines are spread outward. This situation leads to tension of the iliac muscle, the length of which becomes insufficient for proper functioning. The upper part of the pelvis is then pulled down and forward towards the pubic bone. As a consequence of the deficit in the length of the hip muscle, compression of the hip occurs, resulting in tension in the area of the pubic bone.

The role of hormones in the development of this ailment is still ambiguous. The influence of hormonal changes in a woman's body is explained in several ways. They are sought to affect the modulation of pain sensation, collagen synthesis and inflammatory processes. Among others, in hormonal changes during the pregnancy period, the causes of increased pelvic joint mobility can be observed in patients with PGP in comparison with healthy women. This leads to a decrease in efficiency in transferring forces and an increase in shear forces acting on the joints.

There are reports regarding the association of metabolic diseases, such as diabetes, with the occurrence of PGP. The etiology in this case is not yet known. Scientific reports on patients with PGP, in whose mothers or sisters also had such ailments, indicate a possible genetic factor. Multi-delivery is indicated as a factor closely related to the risk of developing this disorder.

**DIAGNOSIS OF LUMBAR AND PELVIC PAIN DURING PREGNANCY**

**Clinical diagnosis**

An important role is played by interviews and clinical examination. It is helpful to use scales and dedicat-
ed questionnaires both in assessing functional limitations as well as the severity of symptoms. An example of such a questionnaire is the Pelvic Girdle Questionnaire. The VAS scale is often used to assess functional status and intensity of pain.

The clinical image related to pregnancy LP will be presented below. The assessment of the lumbar spine can be carried out on the basis of the McKenzie Mechanical Diagnosis and Therapy protocol, which can be adapted to be conducted on pregnant women. According to European guidelines, pregnancy-related PGP diagnosis can only be performed after excluding underlying pathology of the lumbar spine. The pain should be between the upper back iliac-spines and the lower edge of the gluteal folds. It can radiate to the back of the thigh and involve the pubic symphysis. The pubic symphysis pain itself is also classified as PGP. The groin and the area around the coccygeal bone may also be painful. The pain is not permanent, it can be triggered by maintaining a static position for a long time and usually occurs within 30 minutes during performing daily activities such as walking, sitting or standing.

Then, a series of tests should be performed to assess individual pain components and help distinguish them from LP. Considered together, they reduce the percentage of false negative results. They can also be divided into provocative and functional tests.

The suggested tests are characterized by high specificity and low sensitivity, that is why it is recommended to use several different ones if possible. In the literature, there are many combinations of the following tests. There is no gold standard for PGP diagnosis, but as a rule, provocation tests have greater reliability and specificity than palpation tests. When performing them on pregnant women, it must be borne in mind that they can cause pain. Tests in a lying position should be performed in the shortest possible time to minimize any symptoms of supination syndrome.

The most commonly used functional tests in PGP diagnosis are:

1. 4P Test (Posterior Pelvic Pain Provocation test);
2. Patrick’s Test (FABER Test – Flexion, Abduction and External Rotation);
3. Long dorsal sacroiliac ligament test (DLR Test);
4. Active Straight Leg Rise (ASLR) test without manual pelvic compression;
5. Modified Trendelenburg Test;
6. Palpation of the pubic symphysis;
7. Gaenslen’s Test;
8. Distraction Test;
9. Compression Test.

### Differentiation of PGP and LPD

For clinical diagnosis and differentiation, a battery of provocative tests is used. However, so-called posterior pelvic pain, i.e. the type of pelvic pain that does not involve the pubic symphysis, may be more difficult to differentiate with LP. The diagnostician should bear in mind that, unlike LP, posterior pelvic pain is characterized by a piercing, stabbing pain in the gluteal region, distal and lateral to the lumbar-sacral transition. A radiating sensation to the back of the thigh or knees may occur (but not necessarily). Back pelvic pain is often related to some load (e.g., during walking), at times there are painless moments, normal range of motion in the hip joint and spinal joints, lack of root symptoms and a positive test provoking pain in the back of the pelvis (the 4P Test). In Table 1, the characteristic features of the discussed ailments are presented.

### Imaging diagnosis

Magnetic resonance (MR) examination is considered to be the safest in further diagnosis of acute ailments, especially those associated with neurological symptoms. It is also recommended in the European guidelines for PGP diagnosis. However, some clinicians direct attention to the risks associated with the MR examination of teratogenic complications, hearing damage or dangerous increase in tissue temperature. There are, nonetheless, no sufficient studies confirming the proposed hypotheses.

The authors of the American College of Radiology guidelines recommend MR testing regardless of the week of pregnancy (i.e. even in the first trimester), when the benefits of the test outweigh the risks.

Computed tomography (CT) is not recommended in the diagnosis related to pregnancy LP pain, but it may be indicated in traumatic injuries in these areas. The estimated radiation dose during a single pelvic CT is lower than the threshold dose causing a significant increase in the risk of foetal damage. Nevertheless, there is an increased risk of later childhood cancer. The risk of damage or subsequent complications increases in the case of repeated tests.

Ultrasound examination (USG) is used in the diagnosis and observation of pubic symphysis pain and its separation. Ultrasound is not associated with a risk to the mother or foetus because it does not lead to an increase in tissue temperature by more than 0.5 degrees Celsius.

### CLASSIFICATION OF LUMBAR-PELVIC PAIN DURING PREGNANCY

LP is pain located above the lumbar-sacral joint with the presence or absence of radiation to the lower limb(s). The pain is often blunt and intensifies when bowing forward. There is a limitation of the spine movement in the lumbar region and increased muscle tension in the spinal erector. Pain is of musculoskeletal origin and resembles that experienced by non-pregnant women.

According to European guidelines, PGP is a specific form of LP which may appear in isolated form or co-exist with LP. The literature underlines the need to use the term pelvic pain to exclude gynecological and/or urological reasons reserved for the term pelvic pain.

PGP can be divided into specific and non-specific:
- Specific PGP is associated with injury and reduced force closure. It appears in the case of pubic symphysis separation as a consequence of delivery. The patient has great

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The main reason is muscular dysfunction, which leads to disturbances in the stabilization of the lumbar and pelvic complex. It is recommended to differentiate between LP and PGP and to consider the pelvis as one functional whole – with pubic symphysis. PGP diagnosis should be based on characteristics of reported pain, functional limitations of the patient, a series of positive provocation tests and the exclusion of causes originating from the lumbar spinal region.

According to evidence-based medicine, measures are being taken to standardize the divisions and procedures used. The presented classification and quoted guidelines have not been widely used in Poland until now. The introduction of the popular nomenclature on pregnancy ailments abroad will allow for easier exchange of experience between professionals and better patient care.

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CONCLUSIONS

LPP is a frequent disorder occurring in the pregnancy period. It may result from biomechanical and hormonal changes taking place during pregnancy. Among the discussed forms of LPP, PGP brings the greatest consequences for everyday functioning. The main reason is muscular dys-
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