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Pelvic ring stabilization in the peripartum injuries

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Abstract

Background: Parturition-induced pelvic injuries after spontaneous vaginal delivery sometimes happen causing deformation of the pelvic ring. The frequency of these lesions is from 1:300 to 1:30000 births, creating many problems for young women in postpartum life.

Material and methods: Under our follow-up there were 14 patients with disruption to the pelvic ring II-III degree during labor. Special bed position was recommended for the patients (n=4) with rupture of the pubic symphysis II degree. Sacroiliac joint subluxation was reduced by manual traction in multiparous patients (n=3) with disruption of III degree. Closed pelvis osteosynthesis by external device was performed.

Results: Osteosynthesis was performed in trauma clinic, taking into account that patients had breast-fed children. The maximum anesthesia time was up to 30 minutes. Closed reposition of the pelvic bones and stabilization by an external device without additional blood loss were performed. Reposition of damaged bone surfaces was achieved in all cases. In 3-4 hours after surgery, the patients were returned to their children. From the second day they were able to get up, move around the room, take care of the children. Long-term results of treatment were evaluated from 1.5 to 14 years and rated as good.

Conclusions: Rupture of the pelvic ring in women during childbirth requires qualified diagnostics and appropriate treatment. Conservative treatment does not give stable clinical result in multiparous women with disruption of II degree.

Key words: rupture, pubic symphysis, delivery, external fixation.

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Introduction

The widening of the pelvic ring joints in the third trimester of pregnancy is physiological and helps to prepare the woman's birth canal for a successful delivery [1, 2]. However, activity of the hormone relaxin and its metabolites in the blood or a high sensitivity of a pregnant woman to it can cause excessive relaxation of the pelvic ligaments and cartilage [3-6]. Numerous factors including multiparity, macrosomia, cephalo-pelvic disproportion, previous trauma, abnormality due to congenital dysplasia, osteomalacia, chondromalacia, rickets, tuberculosis, rapid progression of second stage of labor and rapid descent of presenting part, and epidural anesthesia have been suggested as possible risk factors for the diastasis of the pubic symphysis and sacroiliac joints or damage to the coccyx [7, 8]. The frequency of these lesions is from 1:300 deliveries to 1:30000 deliveries [9, 10]. Diastasis between the pelvic bones, formed during childbirth and preserved in the postpartum period for more than 2-3 weeks, is a pathological condition that causes deformation of the pelvic ring due to the onset of instability [11-13]. These rare complications can cause significant disability in young women in the postpartum life [14, 15]. The aim is to determine the criteria for early stabilization of the

pelvic ring when it is damaged due to childbirth, taking into account the individual particularities of the woman in labor.

Material and methods

The study group included 14 patients with diastasis of the pubic symphysis of the II-III degree, that was formed during childbirth. The age of the women in labor was from 23 to 37 (28.5 ± 1.4 , $p < 0.05$). Four patients were primiparous, the rest were multiparous. The damage to the pubic symphysis was determined in the maternity in 8 patients, by the attending physician and they were transferred to a specialized trauma clinic. Three of them were examined by an orthopedist in the first 24 hours after delivery. They had a rupture of the pubic symphysis III degree with subluxation in the sacroiliac joint, that was accompanied by functional limb shortening and severe pain. A hematoma gradually spread 3-5 days after delivery, along the medial surface of the thigh, along the adductor muscles (*mm. adductor longus et brevis*), from top to bottom. It indicated the presence of the intrapelvic bleeding after rupture of the symphysis pubis and damage to the hypertrophied vascularization of the small pelvis, paravesical venous plexus.

Six patients came by themselves and were consulted

within a month after childbirth. Their main complaints were: characteristic pain in the symphysis area, which intensified turning in bed, trying to actively move the legs. Women could not get out of bed without help, could not walk. Patients took an unusual position in bed – “the pose of a frog”, lying on their back with their abducted hips and slightly bent knees. Constant pain in the lumbar region, “duck gait” or positive Trendelenburg sign were also present.

All patients were examined by comprehensive clinical and laboratory tests upon admission. Therefore, special attention was paid to the orthopedic status of the women: the condition of the pelvic ring and lower limbs. Pathological rupture of the pelvic bones was determined from 14-20 mm to 50-70 mm and the patients felt severe painful sensations immediately after childbirth, especially primiparous. Multiparous patients suffered from mild or moderate pain in the pelvic ring and in the region of medial surface of the middle third of the thigh. Bladder dysfunction, gait disturbance, loss of active movement and difficulty in caring were present in some patients. Patients with coccyx lesion (n=2) suffered from the clinic of coccydynia – pain in the sacrococcygeal zone that progressed during a long sitting, or standing up and bending frontwards.

X-ray examination of the pelvis included the anterior-posterior and inlet views visualizing the pubic symphysis and sacroiliac joints. The diastasis between the pubic bones was 14-20 mm (II degree) in 6 patients. Pubic symphysis rupture between 22-34 mm (III degree) was radiographically determined in 5 patients, with various vertical displacement. The diastasis between the pubic bones was up to 70 mm in other 3 patients with articular space enlargement of the sacroiliac joint on the left side. They had a third degree rupture of the pubic symphysis and subluxation of the sacroiliac joint, which were accompanied by functional shortening of the limb and severe pain.

After childbirth, when diagnosing damage to the symphysis pubis, the parturient patients were placed on the left side, with a weight (2-3 kg) on the right, that avoids compression on the inferior vena cava by the uterus, decreased venous return and associated hypotension. In the supine position, compression of the inferior vena cava by the uterus is observed, with the possibility of a 30% reduction in cardiac output, which significantly worsens the general condition of the patient and changes the resuscitation process [16].

In the group of multiparous (n=3), after radiography and determination of a third degree pubic symphysis rupture with subluxation in the sacroiliac joint, the subluxation was removed by manual traction and the pelvis and lower limb were immobilized.

Case A. A 34-year-old, 79 kg woman (gravid: 3, parity: 3) was examined in maternity for anterior groin, lower-back (on the left side), and hip pain associated with leg movements. She had delivered an infant weighing about 3800 g 18 hours previously. The delivery occurred at 38 gestational weeks after an uncomplicated prenatal course and followed 7-8 hours of continuous second-stage labor attended by a physician. No medication was administered to induce or

augment labor. During and immediately after delivery, the patient felt a shearing pain in the area of the pubic symphysis and reported that she was unable to move from the table.

Clinical examination: the patient lay on her back, the left leg was abducted, in the supination position, functional shortening of the limb. X-ray showed rupture to the pubic symphysis and left ilio-sacral syndesmosis with displacement of the left pelvic bone in the cranial and lateral directions. After anesthesia, according to emergency indications, the subluxation was reduced by manual traction, the limb was immobilized. Immobilizing bandages were applied at the level of the pelvis, trochanteric region of the thigh and the upper third of the leg. The patient was transferred to a specialized trauma department and urgently operated – closed osteosynthesis of the pelvic ring was performed using an external fixation device.

When the patients were admitted to our trauma department, to perform a stabilizing operation on the pelvis, a repeated complex clinical, radiological and laboratory examination was carried out, with a mandatory examination by a gynecologist. The osteosynthesis was performed in this group of patients, taking into account that their children were breastfed. The maximum anesthesia time was up to 30 minutes. Bladder catheterization was obligatory, to exclude infringement of its wall. Closed reposition of the pelvic bones was performed on an orthopedic table and a stabilizing version of the external pelvic fixation device was applied. In the presence of pubic diastasis up to 20 mm and the absence of free bone fragments (n=5), the diastasis was immediately reduced, and interfragmental compression was created. In the remaining cases (n=9), after the application of the external pelvic fixation device, prolonged reduction was performed until the fragments were completely adapted, followed by their compression. Patients were discharged home to the children in 3-4 hours after the operation, after X-ray control and with a stable satisfactory condition of the puerperas. From the second day they could get up without help, move around the room, take the children in their arms and feed them. Three patients with damage to the symphysis pubis and ilio-sacral syndesmosis were recommended to use additional support (crutches) for 6 weeks. A protective cover was used to exclude traumatization by the device parts in the postoperative period. X-ray control was performed once a month.

Results and discussions

The symphysis pubis is a semi-joint with extremely limited possibilities for movement. Normally, the width of the symphysis (the distance between the pubic bones) can be up to 10 mm. During the day, this distance can change, depending on the water and electrolyte balance of the body, on the amount of joint fluid [1, 17]. The true distance between the pubic bones is determined by analyzing X-rays in dynamics, which, despite their objectivity, introduce certain errors into the pelviometry system. According to A. M. Novikov (cited by [9]), the width of the pubic symphysis changes with age:

it is ~ 6 mm at the age of 18-20 years, and it is ~ 2 mm in older women. Of course, these are, averaged values. But these values must be added to the projection magnification – up to 32% of the true one, and then we obtain an X-ray image of diastasis between the pubic bones on radiograms.

According to clinical and radiological data, there is a gradation of the pubic symphysis ruptures (more than physiological widening – 5-6 mm) [9]:

I degree – up to 5-9 mm;

II degree – up to 10-20 mm;

III degree – more than 20 mm.

This classification is relative, since the position of the pubic bones at the moment of maximum discrepancy in childbirth and during radiography is different. Physiological widening between the pubic bones up to 10 mm, without damaging the joints and soft tissue structures of the birth canal is the norm, because the body of a pregnant woman is preparing for childbirth. If a postpartum woman has a clinic of ligaments lesion in the region of the pubic symphysis with displacement of bones and the formation of significant diastasis, in such cases the result of treatment is determined by correct orthopedic diagnosis and early stabilization of the pelvis.

Until now, most surgical interventions for reduction of the pubic symphysis diastasis were performed using internal fixation – plates and screws installed on the pubic bones [12, 18]. Although internal fixation provides good structural support, this technique cannot be used if the patient with postpartum diastasis of the pubic symphysis has significant reproductive organs damage and there is a high risk of soft tissue infection or osteomyelitis, that has not received sufficient attention in the medical literature nowadays [19, 20].

The analysis of treatment outcomes of the pelvic ring injuries during childbirth by the external fixation device has indicated that the optimal method of treatment for this category of patients is early external fixation of the pelvis. The method is minimally invasive, does not cause additional blood loss, is not prolonged during implementation [13]. The reduction of diastasis between the pubic bones facilitated the alignment of the articular surfaces in the sacroiliac joint and no additional interventions were required.

In this prospective study, all 14 patients completed treatment without complications. The duration of fixation in primiparous patients was 46 ± 1.1 days; in the rest of the patients, the period of fixation of the pelvis with external device was on average 58.66 ± 2.6 days ($p < 0.05$). The surgical treatment outcomes of patients with peripartum pelvis injuries during the first year were assessed using S. A. Majeed scale (1989) as excellent ($n=9$) and good ($n=5$).

Long-term results from 1.5 to 12 years were studied in 9 patients. No complaints are present, the women walk without limp. Diastasis of the pubic symphysis after closed pelvic osteosynthesis remained at the level of 4-6 mm.

Conclusions

The widening of the pubic articulation is a result of the ongoing physiological changes in the body of a pregnant

woman, as an adaptive process to facilitate childbirth, i.e. these are normal changes. But the rupture of the pubic symphysis in excess of the physiological discrepancy of 5-6 mm becomes the concern of orthopedists, who must promptly establish the correct diagnosis and conduct surgical treatment at early stage. External pelvic fixation is an alternative treatment for symphysis pubis diastasis. Conservative treatment of the II-III degrees of the symphysis rupture does not give a stable clinical result and transfers young women to chronic patients.

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Authors' contribution

VK and AK acquired, interpreted the data, VK and GG drafted the first manuscript, VK and AK performed most of the analyzed interventions, VK designed the trial, GG and IP revised the manuscript critically. All the authors revised and approved the final version of the manuscript.

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Ethics approval and consent to participate

The research was approved by the Research Ethic Board of *Nicolae Testemitanu* State University of Medicine and Pharmacy (protocol No 6 of March 3, 2020). Written informed consent was obtained from all participants in the study.

Conflict of Interests

The authors have no conflict of interests to declare.

