Acta Clin Croat 2006; 45(Suppl 1): 87-94 Professional Paper

EFFECT OF AMNIOTOMY ON UTERINE MUSCLE ELECTRICAL ACTIVITY DURING LABOR INDUCTION WITH OXYTOCIN AND PROSTAGLANDINS

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SUMMARY – The aim of the study was to find out whether noninvasive recording of uterine muscle electrical activity could help monitor the development of mechanical myometrial activity during induced labor. Myometrium electrical activity during labor induction was analyzed in 110 gravidas hospitalized at Maternity Ward, Bjelovar General Hospital in Bjelovar. The means used for labor induction was oxytocin infusion in 54, intracervical prostaglandin (dinoprostone 0.5 mg) in 20, intravaginal prostaglandin (dinoprostone 2 mg) in 21, and intravenous prostaglandin (dinoprostone 0.75 mg) in 15 women. Electromyographic measurement was done at 30, 90, 150 and 270 minutes of the induction agent administration. In all pregnancies, silence of the uterus was electromyographically confirmed before the study. During the study, amniotomy was performed in 54 patients: soon after 1st measurement (30th minute of induced labor) in 6, after 2nd measurement (90th minute of induced labor) in 20, after 3rd measurement (150th minute of induced labor) in 10 and after 4th measurement (210th minute of induced labor) in 18 patients. Characteristics of electrical discharge were analyzed separately (number of impulses, amplitudes, series, shape) and each record was merged by index of uterine activity according to Škrablin-Kučić formula: uterine activity index (UAI)=number of impulses during 10 minute period + amplitude (μV) of highest potential divided by 100, by which the series of discharge were marked by additional 20, biphasic waves with 2, and polyphasic with 3 points. Statistical analysis of EMG UAI values obtained on oxytocin labor induction according to modified Bishop cervical index and amniotomy yielded statistically significant differences in the EMG UAI value increase between the patients with and without amniotomy ($p<0.05$). On measurements done at 210 and 270 minutes at Bishop index >8, the values of UAI after amniotomy were not statistically significant ($p>0.05$). Analysis of EMG UAI values in patients administered intracervical prostaglandin for labor induction revealed a statistically significant difference between patients with and without amniotomy ($p<0.05$). Analysis of EMG UAI values in patients administered intravaginal (dinoprostone 2 mg) and intravenous (dinoprostone 0.75 mg) prostaglandin preparation for labor induction showed no statistically significant difference between patients with and without amniotomy ($p>0.05$). Accordingly, recording electrical myometrial activity before and after amniotomy by transcutaneous uterine electromyography during labor induction showed positive correlation with the course and outcome of induced labor, which may prove useful in the induced labor monitoring and guidance.

Key words: *Labor, induced – physiology; Labor, induced – methods; Uterus – physiology; Uterine contraction – drug effects; Oxytocin – therapeutic use; Prostaglandins – physiology*

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Introduction

Labor induction is one of the most common procedures in modern obstetrics. As labor induction is associated with the risk of failure and other complications, the number of subjective and empirical elements that determine the method of labor induction should be minimized.

In clinical setting, uterine activity during labor is easily analyzed by use of electrotocography. Labor is accompanied by general uterine contractions, which are recorded by tocography. The qualitative level provided by external tocography during labor usually proves adequate in daily routine. However, during gestation and at the beginning of induced labor, uterine contractions are partial, discrete, only involving a part and rarely the entire uterus. Because of the method inertness, these can hardly be recorded by external tocography. Therefore, electromyography, a method of myometrial action potential (AP) recording, is employed to analyze such uterine activity. Good correlation has been reported between AP discharge and intrauteringe pressure increase[1-4]. The use of surface, i.e. cutaneous leads, usually silver leads, applied onto the skin over the muscle, is the most appropriate mode of AP discharge for clinical purpose.

The aim of the study was to assess the effect of amniotomy on electromyographic features of myometrium during labor induced by oxytocin and prostaglandin preparations. Results of the study should hopefully provide a more comprehensive insight into the electromyographic events during induced labor. As the recognition of uterine contractions is the starting point for initiation of induced labor, an attempt was made to determine whether monitoring of uterine electromyography (EMG) could help in choosing proper agent for labor induction. As there are a number of methods for labor induction, it has been hypothesized that the results of this study may help define what method of labor induction to use in each individual patient.

Patients and Methods

The study included 110 pregnant women regularly controlled at Maternity Ward, Bjelovar General Hospital. Study subjects were healthy women, term singleton pregnancy (37^{th} to 42^{nd} week of gestation), with cephalic fetal presentation. Inclusion criteria were as follows: absence of pending preterm delivery, cervical insufficiency, inflammatory disease, impaired glucose tolerance and uterine anomalies. In all study women, labor induction was done between 37^{th} and 42^{nd} week of gestation. Mean age of the study women was 25.2 (SD 4.2) years. Primiparae prevailed (n=56; 50.9%), followed by 34 (30.9%) secundiparae and 20 (18.2%) tertiparae and multiparae. None of the study subjects had taken any nonsteroid antirheumatic, calcium antagonist or other medication that may influence myometrial activity for 7 days before or during labor induction. Amniotic sac integrity was preserved in all women.

There were 47 (42.7%) program labor inductions and 63 (57.3%) indicated labor inductions. Program labor induction was usually performed at completion of 40 weeks of gestation (n=23; 48.9%), followed by 39 weeks (n=10; 21.3%), 41 weeks (n=9; 19.2%) and 38 weeks (n=5; 9.4%). Gestational age for program labor induction was determined on the basis of data on the last menstruation, clinical finding and at least three ultrasound studies with biometry, one of them performed in the first trimester. Fetal maturity was assessed by use of amnioscopy finding of the amniotic fluid milkiness. Maturity of the neonate was estimated by a neonatologist.

Indicated labor induction was indicated by EPH gestosis in 22 (34.9%), amnioscopy finding of meconium waters in ten (15.9%), prolonged pregnancy in 15 (23.8%), intrauterine growth retardation in 13 (20.6%) and extragenital reasons in three (4.8%) women.

Each woman scheduled for labor induction was hospitalized at least one day before the procedure to undergo necessary examination and laboratory testing. The woman was explained the procedure and why completion of delivery with labor induction was advised. Electromyographic studies during labor induction did not influence the choice of procedure, method of labor induction, or labor duration.

In the evening before labor induction, the women received an enema. Labor induction was initiated at 7.00 a.m. by administering the induction agent. The same obstetricians were employed at the maternity ward throughout the study and were engaged in labor induction procedures. Immediately before labor induction, cervical index according to Bishop was determined[5], while the possible fetal suffering and presence of labor pains were excluded by cardiotocography. Based on the value of Bishop index, obstetric findings were categorized into three groups for the study purpose: <5, unfavorable finding for induction; 5-8, relatively favorable for induction; and >8, favorable for induction. When labor pains occurred and the cervix opened by 3 cm during labor induction, rupture of the amniotic sac was performed. In these cases, amniotomy was done immediately upon electromyographic measurement.

Myometrial electrical activity recording

During labor induction, myometrial electrical activity was monitored on an EMG Medelec MS-6 (Medilog, England) oscilloscope with the use of transcutaneous leads made from silver chloride (AgCl) (Croel, Croatia), at beam velocity of 750 m/s in vertical interval and 500 mV amplitude interval. The instrument filters were set at a frequency range of 0.03-8 Hz. Transcutaneous leads (2 pairs) were applied in the left and right uterotubal angle projections and vertically below them at a distance of 10-12 cm. Electro-conductive gel was used for better electrical conductivity between the skin and the leads. Prior to lead application, abdominal skin was cleaned with benzine.

Preliminary EMG measurement was done immediately before the administration of agent for labor induction. Upon transfer to the delivery room and 10-min rest in supine position, EMG measurement of uterine activity was done for 10 min to assess the current uterine activity. One of inclusion criteria for the study was EMG finding of silent uterus, i.e. no EMG activity in terms of contraction. When the presence of AP bursts, polyphasic AP or biphasic AP with amplitudes greater than 500 mV was observed before the administration of induction agent, these women were excluded from the study.

Upon the administration of the induction agent, 20-min EMG measurements were done at regular intervals, i.e. at 30, 90, 150, 210 and 270 min, the result being expressed as a 10-min mean. On each measurement, EMG index was calculated by use of Škreblin-Kučić formula[6]: EMG index = number of individual impulses over 10-min period + highest potential amplitude (μV) divided by 100 (discharge series were evaluated with additional 20, biphasic waves with 2, and polyphasic waves with 3). All measurements were performed by the same examiner (the author). The number and amplitudes of monophasic, biphasic and polyphasic potentials, and AP bursts were recorded in a special form. Only amplitudes of 250 mV and more were recorded because lower voltages were not distinctly presented.

Agents used for labor induction and amniotomy

Oxytocin

The oxytocin preparation Syntocinon® (Novartis Pharma AG, Switzerland) was used for labor induction. Oxytocin was prescribed in a dose of 10 IU in 500 mL saline, initially at a rate of 8 mIU/min in infusion, then increasing the dosage in case of labor pain failure to 32 mIU/min. Oxytocin labor induction was initiated at 7.00 a.m., in delivery room, upon patient connection to cardiotocograph.

EMG study of uterine electrical activity during oxytocin labor induction was performed in 54 women. Cervical maturity as assessed by modified Bishop index was unfavorable (BI <5) in 14, relatively favorable (BI 5-8) in 22 and favorable (BI >8) for induction in 18 women. With this method of labor induction, amniotomy was performed in 33 (61%) women during the first 270 minutes of the procedure.

Intracervical prostaglandin

In cases with unfavorable finding for labor induction (BI <5), dinoprostone in a dose of 0.5 mg in 3 g gel was used. The preparation is commercially available as Prepidil® gel (Pharmacia & Upjohn, Belgium). At 7.00 a.m., prostaglandin gel was endocervically applied using a special spray with a catheter supplied by the manufacturer. It was performed in the delivery room, where the woman stayed for cardiotocographic monitoring.

EMG study of uterine electrical activity during labor induction with endocervical prostaglandin was performed in 20 women, all with cervical maturity as assessed by modified Bishop index unfavorable for induction (BI <5). With this method of labor induction, amniotomy was performed in five (25.0%) women during the first 270 minutes of the procedure.

Intravaginal prostaglandin

Vaginal prostaglandin preparation was used in all three stages of uterine cervix maturity (unfavorable, relatively favorable and favorable). The preparation is commercially available as Prostin E_2® vaginal gel (Pharmacia & Upjohn, Belgium). The preparation contains 2 mg of dinoprostone in 3 g of gel. Upon transfer to delivery room at 7.00 a.m., vaginal gel was applied into the posterior fornix vaginae and the woman stayed there for cardiotocographic monitoring. EMG study of uterine electrical activity during labor induction with vaginal prostaglandin was performed in 21 women: ten with cervical maturity as assessed by modified Bishop index unfavorable for induction (BI <5), relatively favorable (BI 5-8) in eight, and favorable (BI >8) in three women. In this group, amniotomy was performed in nine (42.8%) women during the first 270 minutes of labor induction.

Intravenous prostaglandin

The preparation commercially available as Prostin E_2® ampules (Pharmacia & Upjohn, Belgium) containing 0.75 mg of dinoprostone *per* 75 mL ampule, i.e. 1 mg/mL, was used as intravenous prostaglandin, administered as infusion. An ampule of 0.75 mg dinoprostone was added to 500 mL saline and administered at the initial dose of 0.25 mg/min, i.e. 10 drops *per* min. If a satisfactory result in terms of labor pain failed to occur in 30 min, the dose was increased to 0.5 mg/min, i.e. 20 drops *per* min. If labor pain failed to occur even after 1-2 h, the dose was further increased to 1 mg/min, i.e. 40 drops *per* min. The maximal dose of intravenous dinoprostone was 2 mg/min, i.e. 80 drops *per* min. Prostaglandin (dinoprostone, Prostin E_2® ampules á 0.75 mg) was used for labor induction in 15 (13.6%) women, nine (60%) of them with amniotomy performed during the first 270 minutes of labor induction.

The data thus obtained were statistically analyzed by nonparametric χ^2-test, at the level of significance of $p<0.05$. Results are shown in tables.

Results

Effect of amniotomy on uterine electrical activity during oxytocin labor induction

On oxytocin labor induction, amniotomy was performed in 32 women: at 1st measurement (30th minute of labor induction) in six, at 2nd measurement (90th minute of labor induction) in 15, at 3rd measurement (150th minute of labor induction) in seven, and at 4th measurement (210th minute of labor induction) in four women. The highest proportion of amniotomy procedures in the first 270 minutes were performed when labor induction was associated with a favorable cervical finding (modified Bishop index >8), i.e. in 15 (46.9%) women, followed by 14 (43.7%) women with relatively favorable cervical finding (BI 5-8), and only three (9.4%) women with unfavorable cervical finding (BI <5). In 21 women not all five measurements could be done for the onset of delivery, i.e. labor voltages that interfered with EMG studies of uterine electrical activity (Table 1).

Statistical analysis of EMG uterine activity index (UAI) values recorded on oxytocin labor induction according to modified BI and amniotomy showed statistically significant differences in EMG UAI increase between the patients with and without amniotomy ($p<0.05$). On 210 min and 270 min measurements at BI >8 UAI values after amniotomy were lower than those before amniotomy, however, the difference did not reach statistical significance ($p>0.05$).

Effect of amniotomy on uterine electrical activity during intracervical prostaglandin (dinoprostone 0.5 mg) labor induction

Labor pains occurred within the first 270 minutes, uterine cervix opened by 3 or more cm, and amniotomy was performed in five (25.0%) of 20 women with labor induction by intracervical prostaglandin (dinoprostone 0.5 mg). In all five women, amniotomy was done immediately upon 210-min measurement. The five scheduled EMG measurements were performed in all these 20 women, as none of them completed delivery within the first 270 min of labor induction. EMG UAI values during labor induction with intracervical prostaglandin (dinoprostone 0.5 mg) are presented in Table 2. Analysis of EMG UAI values recorded in women with and without amniotomy showed a statistically significant difference ($p<0.05$).

Table 1. Electromyographic uterine activity index (EMG UAI) during labor induction with oxytocin infusion according to modified cervical Bishop index (BI) and amniotomy

Cervical maturity	UAI 30 min	UAI 90 min		UAI 150 min		UAI 210 min		UAI 270 min	
	No amniotomy	No amniotomy	After amniotomy	No amniotomy	After amniotomy	No amniotomy	After amniotomy	No amniotomy	After amniotomy
BI <5 n=14	15.75	72.64	–	26.25	87*	55	127.6*	39.05	153*
BI 5-8 n=22	60.09	96.68	–	79.17	174.71*	69.14	152.57*	49.43	123.07*
BI >8 n=18	45.97	54	109.17*	82.25	115.17*	142.5	134.36	173	164.25

*p<0.05

Table 2. Electromyographic uterine activity index (EMG UAI) during labor induction with intracervical prostaglandin (dinoprostone 0.5 mg) according to amniotomy

Cervical maturity	UAI 30 min	UAI 90 min	UAI 150 min	UAI 210 min	UAI 270 min	
	No amniotomy	No amniotomy	No amniotomy	No amniotomy	No amniotomy	After amniotomy (n=5)
BI <5 n=20	51.8	73.9	60.55	31.70	20.44	103*

*p<0.05

Effect of amniotomy on uterine electrical activity during intravaginal prostaglandin (dinoprostone 2 mg) labor induction

Labor induction with intravaginal prostaglandin (dinoprostone 2 mg) was used in 21 women, ten (47.6%) of them with amniotomy: at 3rd measurement (150th minute of labor induction) in three, and at 4th measurement (210th minute of labor induction) in seven women. Amniotomy was performed in three (100%) women with favorable cervical finding (BI >8), five (62.5%) women with relatively favorable cervical finding (BI 5-8) and two (20%) women with unfavorable cervical finding (BI <5). In this group, all five EMG measurements were performed, since none of them completed delivery within the first 270 min of labor induction.

Statistical analysis of EMG UAI values recorded on labor induction with intravaginal prostaglandin (dinoprostone 2 mg) indicated that amniotomy caused no statistically significant difference in EMG UAI in comparison with women without amniotomy ($p>0.05$) (Table 3).

Effect of amniotomy on uterine electrical activity during intravenous prostaglandin (dinoprostone 0.75 mg) labor induction

Amniotomy was performed in nine (60%) of 15 women with labor induced by prostaglandin infusion. In five women amniotomy was done immediately upon 2nd measurement (90th minute of labor induction), and in four women after 4th measurement (210th minute of labor induction). Amniotomy was performed in three (37.5%) women with initially unfavorable cervical finding (BI <5), one (25%) woman with relatively favorable cervical finding (BI 5-8) and three (100%) women with favorable cervical finding (BI >8). The last EMG measurement was not done in three (20%) women because the delivery had set in.

Statistical analysis of EMG UAI values recorded on labor induction with intravenous prostaglandin (dinoprostone 0.75 mg) indicated that amniotomy caused no statistically significant difference in EMG UAI in comparison with women without amniotomy ($p>0.05$) (Table 4).

Discussion

In 1984, Lopes *et al.* found good correlation to exist between intrauterine pressure intensity and EMG recordings[1]. In 1992, Ebisawa *et al.* reported on fair correlation between EMG recordings directly from the myometrium and those from abdominal surface[2]. In 1996, Monsour *et al.* carried out an experiment on pregnant monkeys. Using intrauterine balloons for intrauterine pressure measurement they introduced the leads direct-

Table 3. Electromyographic uterine activity index (EMG UAI) during labor induction with intravaginal prostaglandin (dinoprostone 2 mg) according to amniotomy

Cervical maturity	EMG UAI 30 min	EMG UAI 90 min	EMG UAI 150 min	EMG UAI 210 min		EMG UAI 270 min	
	No amniotomy	No amniotomy	No amniotomy	No amniotomy	After amniotomy	No amniotomy	After amniotomy
BI <5 n=10	56.35	55.90	53.5	92.60	–	115.37	143.5
BI 5-8 n=8	43.19	62.38	56.75	114.88	–	118.67	153.8
BI >8 n=3	63.33	109	–	–	149	–	191.33

Table 4. Electromyographic uterine activity index (EMG UAI) during labor induction with prostaglandin infusion (dinoprostone 0.75 mg) according to modified BI and amniotomy

Cervical maturity	EMG UAI 30 min	EMG UAI 90 min	EMG UAI 150 min		EMG UAI 210 min		EMG UAI 270 min	
	No amniotomy	No amniotomy	No amniotomy	After amniotomy	No amniotomy	After amniotomy	No amniotomy	After amniotomy
BI <5 n=8	37	105.68	167.5	–	170.25	–	198.6	181.67
BI 5-8 n=4	46	101.25	126.25	101	158.5	156	211	144
BI >8 n=3	42.33	89.33	–	104.67	–	175	–	–

ly into the myometrium and applied surface leads onto the abdominal skin. The surface leads and myometrial leads produced identical findings, while the electrical activity thus recorded was synchronous with intrauterine pressure changes measured by use of intrauterine balloons[3]. Also in 1996, Buhimshi and Garfield investigated uterine activity by transcutaneous EMG and intrauterine pressure measurement in pregnant rats. During pregnancy and delivery, both methods yielded identical uterine activity recordings[4]. Studies have demonstrated temporal association of EMG discharge of contraction type and tonic intrauterine pressure increase with fetal behavior (EEG activity, eye movements, fetal respiration rate, motions), suggesting that the fetus feels the contractions due to their effect on placental blood flow or intra-amniotic pressure variation following the contraction[7]. The EMG discharges of contraction type that cause minimal intrauterine pressure increase are considered to represent electrical equivalent of Braxton-Hicks contractions[8]. The presence of contractions that follow a regular rhythmical pattern ensure constant fetal surrounding, even a mode of maternal-fetal communication, thus rhythm variation may have unfavorable impact on fetal development[9]. All these studies lead to a conclusion that transcutaneous EMG can provide a representative insight into myometrial electrical activity, with special reference to the convenience of transcutaneous recording.

In the present study of the effect of amniotomy on uterine electrical activity, amniotomy resulted in high UAI increase in the group of women with oxytocin labor induction. This increase was observed irrespective of the labor stage and cervical maturity (Table 1). It was actually a dual effect, i.e. due to the increased fetal head pressure against the cervix, thus triggering Ferguson's reflex increasing the secretion of oxytocin to the circulation[10], and due to prostaglandin production. The barrier to the prostaglandins formed in the amnion is known to vanish with mechanical lesion or inflammation of fetal membranes (amnion and chorion laeve) bordering directly to the decidua, and prostaglandins can reach myometrium *via* chorion laeve and decidua to cause contractions. Amnion is in direct contact with amniotic fluid, and consists of a layer of epithelial cells and subepithelial mesenchymal layer. Chorion laeve consists of trophoblast cells and is in contact with decidua, which in turn is in direct contact with myometrium. Amnion and chorion laeve are avascular fetal tissues, whereas decidua is a vascularized maternal tissue. Reduction in the activity of prostaglandin dehydrogenase (PGDH) results in the entry of prostaglandin of amniotic origin into the myometrium. Thus, it is considered that the PGDH enzyme in chorion regulates the availability of prostaglandin from the amnion towards the uterus. Chorion laeve is a fetal tissue that is metabolically active in relation to prostaglandin because it contains PGDH, and represents a barrier between the amnion where prostaglandins are being synthesized, and decidua and myometrium on the maternal side. During delivery, the activity of PGDH in the fundus region is diminished, with enhanced free passage of prostaglandins from amnion *via* chorion laeve and decidua to the myometrium, and the occurrence of contractions. In the part of membranes covering the lower uterine segment, prostaglandins reach the cervix and cause its maturation[11,12]. For better understanding of the mechanisms of cervical maturation, the long known method of labor induction by digital separation of fetal membranes from the lower uterine segment has recently found reappraisal. Upon separation, the membrane stimulates the activity of phospholipase A_2 and local prostaglandin production[13].

In the group of labors induced by prostaglandins, the EMG UAI increase recorded was considerably smaller upon amniotic sac rupture as compared with oxytocin induced labors. In addition, a statistically significant EMG UAI increase was only recorded in labor induction with the intracervical form of prostaglandin, dinoprostone 0.5 mg. As the effect of Ferguson reflex was always present in both groups of women (oxytocin group and prostaglandin group), it appeared to suggest that the greater UAI increase in the oxytocin group was due to endogenous prostaglandins produced by amniotomy.

The amniotomy produced endogenous prostaglandins also contributed to the stronger action of intracervically administered dinoprostone 0.5 mg. As shown in Table 2, the post-amniotomy EMG UAI at intracervical dinoprostone 0.5 mg induction exceeded significantly the highest mean UAI values obtained by this method of induction. This study could not definitely demonstrate whether the role of endogenous prostaglandins produced by amniotomy exceeded the role of Ferguson reflex triggered oxytocin in producing higher EMG UAI, because all study women were lying in bed throughout the study. It is known that walking, i.e. upright position with stronger manifestation of Ferguson reflex during the first labor stage reduces the length of delivery. Read *et al.* compared two groups of pregnant women with poor labor progression in the active stage of labor. One group of women were allowed to walk around, whereas the other group received oxytocin stimulation. The former group showed a more favorable labor progression[14]. In contrast to this, Roberts *et al.* analyzed the effect of sitting position on labor contractions and found them to be significantly less pronounced during the first labor stage than in lateral position[15].

It is considered that amniotomy as the only procedure can be successfully used for labor induction in 70%-80% of cases, and the majority of deliveries are completed within 24 h provided there is appropriate cervical maturity[16]. The question is whether oxytocin labor induction at immature cervix, even if with amniotomy, could be tolerated in current obstetrics, considering the analysis of induced labor performance and EMG studies. Such labor is generally a time-consuming and painstaking procedure, frequently with uncertain outcome.

Recording of uterine electrical activity from the woman's abdominal skin by use of a specially adjusted instrument and cutaneous leads correlates with the course and outcome of induced labor, and can thus be useful in monitoring and prognosis of the evolution of myometrial mechanical activity during induced labor. EMG activity correlates with intrauterine pressure variation, and the recording of myometrial electrical activity as trigger of the mechanical action is believed to provide a better parameter for myometrial activity assessment than external tocography. At the beginning and during induced labor, uterine contractions are frequently partial, involving only a part of the uterus and rarely extending all over the myometrium, which cannot be presented by tocography. Therefore, electromyography is preferred to tocography for analysis of such myometrial activity. Analysis of EMG patterns with careful evaluation of cervical maturity may point to the choice or change of the means, i.e. method of labor induction.

The method of myometrial electrical activity recording used in the study could be technologically upgraded by use of microprocessor computed instruments, thus obviating visual evaluation of EMG recordings and allowing for more precise analysis of the qualitative and quantitative characteristics of the recordings. Unfortunately, such equipment was unavailable for this or similar studies.

Conclusion

Amniotomy performed during oxytocin induced labor caused a statistically significant increase of myometrial EMG activities as compared with the women in whom amniotomy was not performed. Statistically significant differences were found in all three groups of women with different cervical maturity. A statistically significant increase in myometrial electrical activity after amniotomy was also observed in labor induction with intracervical prostaglandin (dinoprostone 0.5 mg) as compared with the other two prostaglandin methods of labor induction.

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Sažetak

UTJECAJ AMNIOTOMIJE NA ELEKTRIČNU AKTIVNOST MATERNIČNOG MIŠIĆA TIJEKOM INDUKCIJE PORODA OKSITOCINOM I PRIPRAVCIMA PROSTAGLANDINA

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Cilj ispitivanja bio je utvrditi može li neinvazivno praćenje električne aktivnosti materničnog mišića pomoći u praćenju razvoja mehaničke aktivnosti miometrija nakon amniotomije tijekom induciranog poroda. Električna aktivnost miometrija tijekom indukcije poroda ispitana je u 110 trudnica hospitaliziranih u Rodilištu Opće bolnice u Bjelovaru. Sredstvo za indukciju poroda je u 54 ispitanice bila infuzija oksitocina, u 20 ispitanica intracervikalni oblik prostaglandina (dinoproston 0,5 mg), u 21 ispitanice intravaginalni oblik prostaglandina (dinoproston 2 mg) i u 15 ispitanica intravenski oblik prostaglandina (dinoproston 0,75 mg). U svih ispitanica je prije početka indukcije poroda elektromiografski dokazan miran uterus. Elektromiografsko mjerenje učinjeno je 30, 90, 150, 210 i 270 minuta nakon primjene sredstva za indukciju. Tijekom ispitivanja u 54 ispitanice učinjena je amniotomija. Neposredno nakon prvog mjerenja (30. minuta induciranog poroda) učinjena je amniotomija u 6, nakon drugog mjerenja (90. minuta indukcije) u 20, nakon 3. mjerenja (150. minuta indukcije) u 10 te nakon 4. mjerenja (210. minuta indukcije) u 18 ispitanica. Obilježja električnih izbijanja obrađena su pojedinačno (broj impulsa, amplitude, serije, oblik), a svaki zapis je objedinjen indeksom uterine aktivnosti prema formuli Škrablin-Kučić: indeks uterine aktivnosti (IUA) = broj pojedinačnih impulsa tijekom 10-minutnog razdoblja + amplituda (ìV) najvišeg potencijala podijeljena sa 100, pri čemu su serije izbijanja ocijenjene s dodatnih 20, bifazni valovi s 2 i polifazni s 3. Statističkom analizom vrijednosti EMG IUA dobivenih pri indukciji poroda oksitocinom s obzirom na modificirani cervikalni indeks po Bishopu i amniotomiju dobivene su statistički značajne razlike u porastu vrijednosti EMG IUA između trudnica u kojih je učinjena amniotomija i onih u kojih ona nije učinjena ($p<0,05$). U mjerenjima nakon 210 i 270 minuta pri Bishopovu indeksu >8 vrijednosti IUA nakon amniotomije nisu bile statistički značajne ($p>0,05$). Analizom vrijednosti EMG IUA u amniotomiranih ispitanica u odnosu na one u kojih amniotomija nije učinjena pri indukciji intracervikalnim pripravkom prostaglandina utvrđena je statistički značajna razlika u vrijednostima IUA ($p<0,05$). Statistička analiza vrijednosti EMG IUA tijekom indukcije poroda intravaginalnim (dinoproston 2 mg) i intravenskim (dinoproston 0,75 mg) pripravcima prostaglandina nije pokazala da amniotomija uzrokuje statistički značajnu razliku EMG aktivnosti u odnosu na neamniotomirane ispitanice ($p>0,05$). Bilježenje elektromiografskih zbivanja prije i nakon amniotomije transkutanom elektromiografijom uterusa u trudnica tijekom indukcije poroda u pozitivnoj je korelaciji s tijekom i ishodom induciranog poroda te može biti korisno u praćenju i vođenju induciranog poroda.

Ključne riječi: *Porod, izazvani – fiziologija; Porod, izazvani – metode; Maternica – fiziologija; Maternična kontrakcija – učinci lijekova; Oksitocin – terapijska primjena; Prostaglandini – fiziologija*