

## PLACENTAL INSUFFICIENCY IN PREGNANCY AFTER 40<sup>th</sup> WEEK OF GESTATION

Marija Tasic, Vekoslav Lilic, Jelena Milosevic, Vladimir Antic and Milan Stefanovic

Pregnancy after the 40<sup>th</sup> week of gestation is often a great dilemma for obstetrician in diagnostic, therapeutic and in psychological terms as well. The aim of this study was to confirm the phenomenon of placental insufficiency in pregnancy after the 40<sup>th</sup> gestation week, the modality of delivery and perinatal outcome.

The study comprised 3405 deliveries in a period of one year, 391 of which were terminated after the end of the 40<sup>th</sup> gestation week, including healthy pregnant women with singleton pregnancies. Control group included healthy pregnant women delivered between the 37<sup>th</sup> and 40<sup>th</sup> gestation week.

The incidence of deliveries after the 40<sup>th</sup> week of gestation is 11.48%. Non-stress test was reactive in 99.65% of women in the study group. At the same time, CST (constriction – stress test) was assessed as negative in 78.67% of cases. The pathological CST was found in only 1.33% of cases. Doppler ultrasound measurements showed the increased resistance in umbilical artery flow in 3% of cases. Vacuum extraction was used for 16.62% of deliveries in the study group, and 8.73% of deliveries in the control group ( $\chi^2=23.24$ ;  $p<0.001$ ). In the study group, Caesarean section was performed in 14.58% of cases, and in control group in 9.07% ( $\chi^2=11.09$ ;  $p<0.001$ ).

Placental insufficiency induced by duration of pregnancy is a rear phenomenon in uncompromised pregnancy. There was no significant difference in the morbidity and mortality rates between the study and control group. *Acta Medica Medianae* 2007; 46(4):26-30.

**Key words:** post-term pregnancy, placental insufficiency, oligohydramnion, postmaturity

---

Clinic of Gynecology and Obstetrics Clinical Center of Nis

Concact: Marija Tasic  
Clinic of Gynecology and Obstetrics Clinical Center Nis  
48 Dr Zoran Djindjic Blvd.  
Phone: 018/242 284  
E-mail: drmarija@nadlanu.com

### Introduction

Pregnancy after 40<sup>th</sup> week of gestation is often a great dilemma for obstetrician in diagnostic, therapeutic and in psychological term as well. It is assumed that pregnancy after 40<sup>th</sup> gestation week is associated with increased risk of intrauterine fetal and/or postnatal demise. The principal aim of antenatal monitoring is to detect the early appearance of placental insufficiency, before the fetal hypoxia emerges (1). Considering the essence of process of placental development and maturation of fetal placenta, the numbers of investigations suggest that fetal distress caused by the post-term delivery in uncompromised pregnancies is, the first of all, feto-placental problem (2). A great number of structural changes that could be seen on the placental structure after the 40<sup>th</sup> week of pregnancy usually do not interrupt

normal fetal oxygen supply because the reserve capacity of placenta is concluded to be greater than it was assumed before. The literature data show that only 5% of children born after the term of delivery show signs of dysmaturity whose etyology is not yet established. It is known that syndrome which is similar to postmaturity syndrome can be seen before the 40<sup>th</sup> week of gestation as well. Prolongation of pregnancy is often followed with continuation of fetal growth, which sometimes leads to fetal macrosomia (3). A number of data suggest that 80% of pregnancies after the 40<sup>th</sup> week of gestation is not characterized with signs of fetal distress (4). Fetal distress induced by prolonged gestation is considered to be the result of nutritive as well as respiratory insufficiency of placenta with consequent oligoamnion and umbilical cord compression (5).

Until these days, there is no consistent position about the treatment of pregnancy after the 40<sup>th</sup> gestation week with uncompromised preexisting placental function. There is always the same dilemma: is it advisable to wait for the appearance of signs of latent placental insufficiency and induce labor in that moment or to routinely terminate every pregnancy after 40<sup>th</sup> week of gestation.

## Aim

The principal aims of this study were to reveal the appearance of placental insufficiency in pregnancy after 40<sup>th</sup> gestation week, to determine the modality of termination of pregnancy and to establish the perinatal outcome. This study, also attempts to give its contribution to persistent efforts of modern perinatology in establishing a list of rational and credible procedures applied in surveillance and in termination of these pregnancies.

## Material and methods

The research is conducted on the Clinic for Gynecology and Obstetrics in Clinical Center Nis. The study comprehended 3405 deliveries in the period of one year, of which 391 were terminated after the end of the 40<sup>th</sup> gestation week, including healthy pregnant women with singleton pregnancies. Control group is represented with healthy pregnant women who delivered babies between 37<sup>th</sup> and 40<sup>th</sup> gestation week.

The results of study are systematized and shown in tables. For the purpose of testing the study hypothesis, we have used the statistical method of quantitative analysis using: arithmetic mean, standard deviation (SD) and variation interval. Statistical tests that were used in testing hypothesis were: Student's t-test,  $\chi^2$  test and Fisher's test of exact probability.

## Results

The incidence of deliveries after the 40th week of pregnancy on the Clinic for Gynecology and Obstetrics in Nis is 11.48%. The most frequently used test for evaluating the function of feto - placental unit was «non - stress» test (NST), followed with «oxytocine challenge» test (OCT also known as Constriction stress test -

CST) and Doppler vellocity measurement in fetal, fetoplacental and uteroplacental circulation. NST was interpreted as reactive in 99.65% of cases. This number includes cases of suspicious reactivity, which is changed in reactive NST after the test was repeated. The CST was negative in majority of cases (78,67%), followed with suspicious record in 11,56% of cases. The CST was interpreted as inadequate in 8,44% while the positive CST was found in only 1.33% of cases. Doppler ultrasound velocity measurement showed an increased resistance in umbilical artery in 3% of patients while there was no record of absent or reversed end-diastole flow in umbilical arteries. There were no pathological findings in the uteroplacental vascular compartment neither in fetal cerebral artery nor in fetal venous flow, as well.

The results indicate that there is statistically significant difference between two groups of patients, showing higher incidence of operative management of delivery in pregnancy after 40th gestation week group of women. In that group, vacuum extraction was used in 16,62% of cases, while the incidence of that obstetric intervention in control group was 8.73% ( $\chi^2=23,24$ ;  $p<0,001$ ). The incidence of Caesarian section in experimental group was 14,58% vs. 9,07% in the control group ( $\chi^2=11,09$ ;  $p<0,001$ ). The most frequent indication for Caesarian section in experimental group was intrauterine fetal hypoxia (40,35%) and dystotia (36,84%) with statistically significant difference in incidence of those indications between examined groups ( $p<0,05$ ;  $p<0,001$ ). The difference in incidence of uterine dystotia as indication for Caesarian section delivery between two groups (36.84% in after 40th gestation week group vs. 7.92% in control group), can be very indicative if we consider the high delivery induction rate after 40<sup>th</sup> week of gestation (12.28%) in contrast to control group rate (1.21%,  $p<0.001$ ).

Table 1. Antepartal test results for evaluating the condition of fetoplacental unit in pregnancies after 40<sup>th</sup> week of gestation

Sort of test	Characteristics	n	%	$\Sigma$
Non-stress test	Reactive	288	99.65	289
	Non-reactive	1	0.35	
Constriction challenge test	Negative	177	78.67	225
	Inadequate	19	8.44	
	Suspicious	26	11.56	
	Positive	3	1.33	
Doppler ultrasound	Normal	97	97.00	100
	Increased Pourcelot index (RI) in umbilical artery	3	3.00	

Table 2. The most frequent indications for Caesarean section in examined and control group

Indications	Examined group		Control group	
	n	%	n	%
Intrauterine hypoxia	23	40.35	62	25.83
Uterine dystocia	21	36.84	19	7.92
Feto-pelvic disproportion	10	17.54	22	9.17
Iterative Caesarean section	3	5.26	93	38.75
$\Sigma$	57	100.00	196	81.67

Table 3. Perinatal morbidity in examined and control group

Morbidity	Examined group		Control group	
	n	%	n	%
Post(dys)maturity syndrome	2	0.51	15	0.57
Neonatal asphyxia	10	2.56	35	1.32
Aspiration syndrome	30	7.67	80	3.02
Intracranial hemorrhage	2	0.51	10	0.38
Fracture of clavicle	7	1.79	40	1.51
Brachial plexus paresis	1	0.26	9	0.34
Σ	53	13.55	198	7.48

The incidence of oligoamnion in the 41<sup>st</sup> week of pregnancy is 16.44% with tendency of increased incidence in 43<sup>rd</sup> week which was 30.77%. Regardless to higher rate of low Apgar score in after 40<sup>th</sup> gestation week group with oligoamnion, there was no statistically significant difference in perinatal outcome between pregnancies after 40<sup>th</sup> gestation week with oligoamnion (Apgar score =8,86+/-0,67), and the same pregnancies with optimal amount of amniotic fluid (Apgar score=8,81+/-0,89), (t=0,451; p>0,05).

The majority of neonates born in after 40<sup>th</sup> gestation week group had a delivery weight between 3500 to 3999 g (45,78%) vs. 5,63% of neonates in group between 2500 to 2999 g, what is also the lowest incidence of neonatal delivery weight. The incidence of neonatal macrosomia (delivery weight over 4000 g) was found in 17% of cases.

The post-maturity syndrome was found in 0,51% of cases in post-term group of patients, while the finding of dysmaturity syndrome in control group had the incidence of 0,57% (p>0,05). The incidence of neonatal asphyxia was 2.56% after 40<sup>th</sup> gestation week group vs. 1,32% in control group with also insignificant difference. In addition, there was insignificant difference in rate of other hypoxic or mechanic neonatal injuries between those two groups. In conducted study there was no record of perinatal mortality (prepartal, intrapartal and postnatal) after 40<sup>th</sup> gestation week group of pregnancies.

## Discussion

The results in this study show that the frequency of delivery after 40<sup>th</sup> gestation week in our clinic is 11,48%. This incidence is not different from the incidence in other medical centers, which is 4-14% (5). Up date, there has not been a clear and consistent doctrinarian attitude about the beginning, rhythm and the perspective of antenatal surveillance of pregnancy after 40<sup>th</sup> week of gestation. Antenatal tests that were conducted in this study, strongly suggest the absence of signs of early (Doppler) or late (CTG) centralization of fetal circulation. Normal values of Doppler velocity indexes in uteroplacental circulation confirm the assumption that in pregnancy after

40<sup>th</sup> gestation week problems arise not from the uteroplacental unit, but rather from changes in fetoplacental circulation (2). The numbers of investigators were conducting Doppler velocity measuring in uteroplacental, fetoplacental as well as in fetal vascular compartment. Normal values of Doppler indexes in uterine arteries, umbilical and medial cerebral artery of fetus are also found in pregnancy after 40<sup>th</sup> week of gestation with unsatisfactory perinatal outcome (6,7,8,9,10). According to our results, findings in those studies suggest that unsatisfactory perinatal outcome is possible in post - date pregnancy, even if there is no placental insufficiency. This finding also shows that bad perinatal outcome is under the influence of some other variables that are not connected with prolonged pregnancy.

Some other studies suggest that the pathogenesis of placental insufficiency in post-date pregnancy is different from the development of the same entity in other periods of pregnancy. Those who overlook that fact are in a position to easily impute the reason for placental insufficiency to prolongation of pregnancy. Fetal problems can occur when there is a discrepancy between the genetic potential for fetal growth and functional capacity of placenta, regardless of the fact that pregnancy exceeds 40<sup>th</sup> week of gestation. In order to avoid hypoxia, fetus will slow down its growth, it will increase erythropoiesis, hematocrit level and blood viscosity, what leads to endothelial lesions and release of endothelial mediators which are responsible for microembolisation of the terminal villi vessels. If that particular pregnancy is not terminated in appropriate moment, progressive reduction of terminal villi blood supply will finally lead to fetal hypoxia, even to fetal demise. However, histological signs "typical" for postmature placental deterioration were never found (2).

Despite all findings that support placental "resistance" to deterioration of function in pregnancy after 40<sup>th</sup> gestation week, the results of our study clearly show increased incidence of operative obstetric interventions in examined group in comparison to control group. Analysis of medical documentation suggests that the decision of medical practitioner to use operative intervention

in management of pregnancy after 40<sup>th</sup> gestation week is based on much more rigorous criteria than the same decision in control group. This difference can be explained with more intensive psychological pressure of the obstetrician, which is caused by the lack of consistent protocol that will offer an answer on "how" and "when" to terminate the pregnancy. Other factors that also have to be considered in making final decision are: the fear of legal responsibility, uncertainty in fetal condition, distrust in methods of fetal surveillance and following of medical trends.

Statistically significant difference between two groups in frequency of hypoxia and dystocia as indications for operative management of delivery, can be explained with greater number of inductions in study group, inadequate use of medications in induction and stimulation of labor, with obstetrician's impatience and with misinterpretation of intrapartum CTG. In the numbers of similar studies, the results support our finding of higher rate of Caesarian sections in examined group as well as the higher birth weight of neonates (11,12) without significant difference in perinatal outcome (13,14,15). Some investigators suggest that all women that are planned for labor induction after 40<sup>th</sup> gestation week should be informed about the greater possibility for operative termination of the delivery (16).

Our results, as the results of other similar investigations show that the perinatal outcome in pregnancies after 40<sup>th</sup> week of gestation with oligoamnion is not much different from the same pregnancies with optimal amount of amniotic fluid (17). Because of the low sensitivity of the amniotic fluid index (AFI) in prediction of poor perinatal outcome, some authors consider that its routine measurement leads to increased rate of obstetric interventions without the improvement of perinatal outcome (18). On the other hand, others emphasize its usability in prediction of poor perinatal outcome (19).

### Conclusion

Placental insufficiency induced by the duration of pregnancy is a rare phenomenon in uncompromised pregnancy. The incidence of operative interventions in the delivery obviously rises after 40<sup>th</sup> gestation week. There was an insignificant difference in the morbidity and mortality rate between the study and control group. Correct dated pregnancy will rarely exceed 42<sup>nd</sup> week of gestation, and the reconciliation of scientific opinions about that field of obstetrics will give its contribution to the attempt of modern perinatal medicine to decrease the rate of delivery inductions which will at the same time decrease the incidence of unnecessary obstetric interventions.

### References

- Nicolaides KH, Rizzo G, Hecher K. Placental and fetal Doppler. Diploma in fetal medicine 2003;149-56.
- Rightmire DA, Campbell S. Fetal and maternal Doppler blood flow parameters in postterm pregnancy. 1987;69:891-4.
- Nahum GG, Stanislaw H, Huffaker BJ. Fetal weight gain at term. Linear with minimal dependence on maternal obesity. Am J Obstet Gynecol 1995;172: 1387-9.
- Usher RH, Boyd ME, McLean FH, Kramer MS. Assessment of fetal risk in postdate pregnancies. Am J Obstet Gynecol 1988;158:259.
- Kurjak A i sar. Prenosjenje. In: Ginekologija i perinatologija. Varaždinske toplice: Tonimir; 2003.p.313-5.
- Brar HS, Horenstein J, Medearis AL, Platt LD, Phelan JP, Paul RH. Cerebral, umbilical, and uterine resistance using Doppler velocimetry in postterm pregnancy. J Ultrasound Med 1989;8:187-91.
- Farmakides G, Schzman H, Ducey J, Guzman E, Saladana L, Penny B, Winter D. Uterine and umbilical artery Doppler velocimetry in postterm pregnancy. J Reprod Med 1988;33:259-61.
- Stokes HJ, Roberts RV, Newnham JP. Doppler flow velocity waveform analysis in postdate pregnancies. Aust N Z J Obstet Gynaecol 1991;31:27-30.
- Zimmermann P, Alback T, Koskinen J, Vaalamo P, Tuimala R, Ranta T. Doppler flow velocimetry of the umbilical artery, uteroplacental arteries and fetal middle cerebral artery in prolonged pregnancy. Ultrasound Obstet Gynecol 1995;5:189-97.
- Bar-Hava I, Divon MY, Sardo M, Barnhard Y. Is oligohydramnios in postterm pregnancy associated with redistribution of fetal blood flow? Am J Obstet Gynecol 1995;173:519-22.
- Hovi M, Raatikainen K, Heiskanen N, Heinonen S. Obstetric outcome in post-term pregnancies: time for reappraisal in clinical management. Acta Obstet Gynecol Scand 2006;85(7):805-9.
- Treger M, Hallak M, Silberstein T, Friger M, Katz M, Mazor M. Post-term pregnancy: should induction of labor be considered before 42 weeks? J Matern Fetal Neonatal Med 2002;11(1):50-3.
- Carlomagno G, Candussi G, Zavino S, Primerano MR. Postmaturity: how far is it a clinical entity in its own right. Clin Exp Obstet Gynecol 1996;23(1):41-7.
- Hannah ME et al. Induction of labour as compared with serial antenatal monitoring in postterm pregnancy. N Engl J Med 1992;326:1587-9.
- Alexander JM, McIntire DD, Leveno KJ. Forty weeks and beyond: pregnancy outcomes by week of gestation. Obstet Gynecol 2000;96(2):291-4.
- Bodner-Adler B, Bodner K, Pateisky N, Kimberger O, Chalubinski K, Mayerhofer K, Husslein P. Influence of labor induction on obstetric outcomes in patients with prolonged pregnancy: a comparison between elective labor induction and spontaneous onset of labor beyond term. Wien Klin Wochenschr 2005;117(7-8):287-92.
- Pasquini L, Nasto R, Mie Me, Giuliani B, Periti E. Amniotic fluid analysis as a screening test in term and post-term pregnancy. Minerva Ginecol 2003; 55(1):69-73.
- Morris JM, Thompson K, Smithey J, Gaffney G, Cooke J, Chamberlain P, Hope P, Altman D, MacKenzie IZ. The usefulness of ultrasound assessment of amniotic fluid in predicting adverse outcome in prolonged pregnancy: a prospective blinded observational study. BJOG 2003;110(11): 989-94.
- Hassan AA. The role of amniotic fluid index in the management of postdate pregnancy. J Coll Physicians Surg Pak 2005;15(2):85-8.

## PLACENTNA INSUFICIJENCIJA U TRUDNOĆI POSLE 40. NEDELJE GESTACIJE

Marija Tasić, Vekoslav Lilić, Jelena Milošević, Vladimir Antić i Milan Stefanović

Trudnoća posle 40. gestacijske nedelje često predstavlja tešku dilemu za akušera i to u psihološkom, dijagnostičkom i terapijskom smislu. Cilj rada bio je da utvrdi pojavu placentne insuficijencije u trudnoći posle 40. nedelje gestacije, način dovršavanja kao i perinatalni ishod takvih trudnoća.

Analiziran je klinički materijal u jednogodišnjem periodu koji obuhvata 3405 porođaja, od toga 391 porođaj posle 40. nedelje gestacije zdravih trudnica sa jednoplodnom trudnoćom. Kontrolnu grupu čine zdrave trudnice porođene u periodu između 37. i 40. nedelje gestacije.

Incidenca porođaja posle 40. ng iznosi 11,48%. U ispitivanoj grupi u 99,65% slučajeva non-stres test bio je reaktivan. Oksitocinski stres test je bio negativan u 78,67% slučajeva, dok je pozitivan test dobijen samo u 1,33% slučajeva. Doplerska merenja su u 3% slučajeva pokazala povećanje indeksa otpora kroz umbilikalne arterije. Vakuum ekstrakcijom dovršeno je 16,62% porođaja u ispitivanoj, a u kontrolnoj grupi 8,73% ( $\chi^2=23,24$ ;  $p<0,001$ ). Carskim rezom, u ispitivanoj grupi, dovršeno je 14,58%, a u kontrolnoj 9,07% porođaja ( $\chi^2=11,09$ ;  $p<0,001$ ). Sindrom postmaturiteta u ispitivanoj grupi imalo je 0,51%, a sindrom dismaturiteta u kontrolnoj grupi imalo je 0,57% neonatusa ( $p>0,05$ ). Perinatalni mortalitet u ispitivanoj grupi nije zabeležen.

Placenta insuficijencija uslovljena dužinom nošenja je retka pojava kod zdravih trudnica. *Acta Medica Medianae* 2007; 46(4):26-30.

**Ključne reči:** posttermiska trudnoća, placenta insuficijencija, oligoamnion, postmaturitet