

Antenatal betamethasone administration before elective caesarean section in term pregnant women

Miadında gebe kadınlarda elektif sezaryen öncesi antenatal betametazon uygulaması

Begum Kurt¹, Gültekin Köse²

¹Department of Obstetrics and Gynecology Clinic of Sivas Numune Hospital, Sivas, Turkey

²Department of Obstetrics and Gynecology Clinic of Haydarpaşa Numune Research and Training Hospital, İstanbul, Turkey

Corresponding author: Begum Kurt, MD, Department of Obstetrics and Gynecology Clinic of Sivas Numune Hospital, Sivas, Turkey

E-mail: dr.begumkurt@yahoo.com.tr

Received/Accepted: October 16, 2019 / December 31, 2019

Conflict of interest: There is not a conflict of interest.

SUMMARY


Objective: The aim of this study is to show that respiratory problems such as respiratory distressed syndrome and transient tachypnea of newborn can be reduced by antenatal betamethasone administration.

Method: The study was conducted on 50 mothers and their babies aged between 21 and 38 years in the Obstetrics and Gynecology Clinic of Haydarpaşa Numune Training and Research Hospital between January 2007 and March 2008. Betamethasone was administered to 25 patients who were planned for cesarean section at term due to elective reasons (Group I). The Group II consisted of 25 patients planned for elective caesarean section at term and no betamethasone was administered. Groups were compared according to maternal age, maternal smoking, maternal chronic disease history, gestation day, cesarean section type of anesthesia, birth weight and sex of the baby. Postnatal infants were evaluated according to Apgar scores of 1 and 5 minutes, ventilation with mask, intubation, resuscitation or intensive care needs. RDS and TNT were recorded.

Results: In the non-corticosteroid-treated group (group 2), two babies developed TNT of the newborn. However, no statistically significant difference was found between the groups ($p > 0.05$). Respiratory distress syndrome did not develop in any of our patients. The abortion rate in Group I (20%) was significantly higher than the abortion rate in Group II (0%) ($p < 0.05$). No other parameters (Age, gravida, parity, number of curettage, number of living children, smoking, presence of chronic disease, anesthesia type) were statistically significant ($p > 0.05$).

Conclusions: The use of antenatal corticosteroid in elective caesarean sections over 37 weeks may cause a decrease in the development of respiratory problems such as RDS and YGT.

Keywords: Bethamethasone, corticosteroid, caesarean section.

 Begum Kurt

 Gültekin Köse

ORCID IDs of the authors:
B.K. 0000-0002-7166-3130
G.K. 0000-0002-7894-8809

ÖZET

Amaç: Bu çalışmanın amacı, antenatal betametazon uygulaması ile solunum sıkıntısı sendromu (RDS) ve geçici yenidoğan taşipnesi (TNT) gibi solunumsal sorunların azaltılabileceğini göstermektir.

Yöntem: Çalışma Ocak 2007 - Mart 2008 tarihleri arasında Haydarpaşa Numune Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum Kliniğinde 21 - 38 yaşları arasındaki 50 anne ve bebek üzerinde yapıldı. Miadında gebelerde

sezaryen planlanan 25 hastaya betametazon uygulandı (Grup I). Diğer 25 hastaya Betametazon uygulanmadı (Grup II). Gruplar maternal yaş, maternal sigara içimi, maternal kronik hastalık öyküsü, gebelik günü, sezaryen anestezi tipi, doğum ağırlığı ve bebeğin cinsiyeti açısından karşılaştırıldı. Doğum sonrası bebekler Apgar skorları 1 ve 5 dakikalık, maskeli ventilasyon, entübasyon, resüsitasyon veya yoğun bakım gereksinimlerine göre değerlendirildi. RDS ve TNT kaydedildi.

Bulgular: Kortikosteroid tedavisi görmemiş grupta (grup 2) iki bebekte yenidoğan TNT gelişti. Ancak, gruplar arasında istatistiksel olarak anlamlı bir fark bulunmadı ($p > 0.05$). Hiçbir hastamızda solunum sıkıntısı sendromu gelişmedi. Grup I'deki abortus oranı (% 20) Grup II'deki abortus oranından anlamlı derecede yüksekti (% 0) ($p < 0,05$). Diğer parametreler (Yaş, gravida, parite, küretaj sayısı, yaşayan çocuk sayısı, sigara içme, kronik hastalık varlığı, anestezi tipi) istatistiksel olarak anlamlı değildi ($p > 0.05$).

Sonuç: Antenatal kortikosteroidin 37 haftanın üzeri gebelerde, elektif sezaryenlerde kullanılması, RDS ve YGT gibi solunum problemlerinin gelişiminde azalmaya neden olabilir.

Anahtar sözcükler: Betametason, kortikosteroid, elektif sezaryen.

INTRODUCTION

Cesarean delivery is increasing in our country as in the whole world. The most important reason for this increase is that patients have social indications (favorable time adjustment, fear of birth, precious baby) rather than medical indications.¹

According to the data of the Ministry of Health, the rate of cesarean section in all deliveries in our country between 1998-2003 was 21.2 percent, and in 2016 it was found to be 53.1 percent.

Respiratory distress syndrome (RDS) of the newborn is a problem of pulmonary maturation at birth due to endogenous surfactant deficiency in the lungs. The surfactant reduces surface tension in the area of air contact with the alveolar surface and thus prevents the alveoli from collapsing during expiration. The frequency of RDS is inversely proportional to the gestational week.

Benign respiratory distress, type II respiratory distress also known as transient tachypnea, is one of the main causes of respiratory distress in newborns. The reason of transient neonatal tachypnea (TNT) is thought to be due to insufficient fetal lung fluid. The presence of tachypnea in the first hours after delivery, lack of septic appearance in the patient, normal laboratory findings to assist sepsis, increased aeration on the chest X-ray, flattening of the diaphragm, an increase in bronchovascular appearance, the presence of fluid appearance in the fissures and pleura and the response to treatment with oxygen below 40% in a short time is diagnostic.^{2,3}

Respiratory distress develops in approximately 1% of newborns. 33-50% of them consist of TNT and RDS⁴. It is known that labor increases vaginal steroid synthesis in vaginal births and accelerates the synthesis of surfactant in the lung in infants. The absence of labor in elective cesarean section is one of the reasons that RDS

and TNT are more common in babies born by cesarean section.

Respiratory distress syndrome (RDS) and TNT in term pregnant women are more common in cesarean delivery than vaginal delivery⁵. Other causes of these two clinical conditions are gestational age, fetal asphyxia, maternal diabetes, asthma, and type of anesthesia used at birth⁵⁻⁸. The development of RDS and TNT often requires the follow-up of newborn infants in neonatal intensive care units. In the literature, routine application of corticosteroids is recommended for births before 34 weeks.^{9,10} Antenatal corticosteroids have been used for many years in pregnancies that threaten preterm birth between 24-34 weeks. It was shown that the decrease in the development of respiratory problems such as RDS and TNT when used before cesarean in pregnancies above 37th week.¹¹ Corticosteroids have been shown to reduce RDS and TNT as well as mortality and morbidity. At the same time, it was found that they did not cause any side effects in infants in early childhood.¹²⁻¹⁵

In this study, we aimed to investigate the effects of antenatal corticosteroids in the development of respiratory problems such as RDS and TNT in elective caesarean sections over 37 weeks.

MATERIAL AND METHODS

This study was conducted between January 2007 and March 2008 in Obstetrics and Gynecology Clinic of Haydarpaşa Numune Research Hospital. A total of 50 mothers and their infants aged between 21 and 38 years were enrolled. The study was approved by the local ethics committee of Haydarpaşa Numune Training and Research Hospital (protocol no: 07-01).

Betamethasone was administered to 25 patients who were scheduled for cesarean section due to elective reasons (Group I). A total of 12 mg betametazon (Celestone Chronodose, IV form,

Full composition: 3,947 mg betamethasone disodium phosphate and 3 mg betamethasone acetate) intramuscular injection; 2 dosage in the morning and 2 dosage in the evening, was administered. The Group II consisted of 25 patients scheduled for elective caesarean section at term and no betamethasone was administered.

Groups were compared according to maternal age, maternal smoking, maternal chronic disease history, gestation day, caesarean section type of anesthesia, birth weight and sex of the baby.

Postnatal infants were evaluated according to Apgar scores of 1 and 5 minutes, ventilation with mask, intubation, resuscitation or intensive care needs. RDS and TNT were recorded.

This is a prospective and randomized study. Randomization was done by using closed envelope method. Betamethasone 6 mg, 2*2 was administered to the patients once. At least 24 hours after the last dose, caesarean was performed.

Exclusion criteria

In 24 hours after antenatal betamethasone administration, the patients who had to be taken by caesarean section for urgent reasons before the efficacy of the drug was formed and the patients with side effects due to corticosteroids. These patients were not included in the study.

Statistical analysis

Statistical evaluation of the findings was performed with SPSS (Windows 15.0) program. Descriptive statistical methods (mean, standard deviation, frequency) as well as the quantitative data were compared with Student's t test. The chi-square test and Fisher's Exact chi-square test were used to compare the qualitative data. The results were evaluated with 95% confidence interval and $p < 0.05$ significance level.

RESULTS

The study was conducted on 50 mothers and their babies aged between 21 and 38 years in the Obstetrics and Gynecology Clinic of Haydarpaşa

Numune Training and Research Hospital between January 2007 and March 2008. The mean age of the mothers was 28.1 ± 4.6 years. In the study, the patients receiving betamethasone were determined as Group I and the patients who were not receiving the drug were Group II.

While 20% of the mothers participated in the study were between 20-24 years old, 48% were between 25-29 years old, 22% were between 30-34 years old and 10% were 35 years and older. While 16% of the cases had 1 gravida, 54% had 2, 30% had 3 and above. While 30% of the cases had no parity, 52% had 1 parity, 18% had 2 parity or more. Abortion was seen in 10% of the cases. 15% of the patients had curettage. While 32% of the cases had no living children, 52% had 1, 16% had 2 or more children. 20% of the cases were smokers. 20% of cases have chronic disease (Two patients had epilepsy, four patients had thyroid disease, two patients had asthma, two patients had rheumatic disease). While 80% of the patients had general anesthesia, 20% had spinal anesthesia (Table 1).

The abortion rate in Group I (20%) was significantly higher than the abortion rate in Group II (0%) ($p < 0.05$). No other parameters (Age, gravida, parity, number of curettage, number of living children, smoking, presence of chronic disease, anesthesia type) were statistically significant ($p > 0.05$), (Table 1).

The birth weight of the babies varies between 2430 g and 4340 g; the average is 3425.4 ± 398.8 gr. 46% of the babies are girls and 54% are boys. The first minute Apgar scores of the babies ranged from 4 to 9; The mean 1st minute Apgar score was 7.7 ± 0.9 . The 5th minute Apgar scores of the babies ranged from 7 to 10; The mean 5th minute Apgar score was 9.5 ± 0.7 . There was no statistically significant difference between the groups in terms of birth weight, gender, Apgar score of 1 min and Apgar score of 5 min. Only 2 babies (4%) had TNT in group II, but this parameter was not statistically significant too. No RDS developed in both groups (Table 2).

Table 1: Evaluation of Maternal Characteristics by Groups

		Group I (n=25) n(%)	Group II(n=25) n(%)	p
Age	20-24	5 (20%)	5 (20%)	0.465
	25-29	14 (56%)	10 (40%)	
	30-34	5 (20%)	6 (24%)	
	35 and over	1 (4%)	4 (16%)	
Gravity	1	2 (8%)	6 (24%)	0.157
	2	13 (52%)	14 (56%)	
	3 and over	10 (40%)	5 (20%)	
Parity	None	5 (20%)	10 (40%)	0.244
	1	14 (56%)	12 (48%)	
	2 and over	6 (24%)	3 (12%)	
Abortus	+	5 (20%)	0	0.05*
	-	20 (80%)	25 (100%)	
Curretage	+	7 (28%)	8 (32%)	0.758
	-	18 (72%)	17 (68%)	
Number of children living	None	6 (24%)	10 (40%)	0.437
	1	14 (56%)	12 (48%)	
	2 and over	5 (20%)	3 (12%)	
Smoking	+	4 (16%)	6 (24%)	0.480
	-	21 (84%)	19 (76%)	
Chronic disease	+	5 (20%)	5 (20%)	1,000
	-	20 (80%)	20 (80%)	
Anesthesia type	General	19 (76%)	21(84%)	0.480
	Spinal	6 (24%)	4 (%16)	

Table 2: Evaluation of the groups according to the characteristics of the babies

		Group I (n=25) Mean value \pm SD	Group II (n=25) Mean value \pm SD	p
Birth weight(gr)		3361,6 \pm 386,8	3489,2 \pm 408	0,262
1. minute Apgar score		7,6 \pm 0,9	7,7 \pm 0,9	0,631
5.minute Apgar score		9,4 \pm 0,6	9,6 \pm 0,8	0,409
Sex	Girl	14 (56%)	9 (36%)	0,156
	Boy	11 (44%)	16 (64%)	
Transient neonatal tachypnea (TNT)	+	0	2 (8%)	0.490
	-	25 (100%)	23 (92%)	

DISCUSSION

While caesarean section was performed at 5% in all births in 1960s, the rate of application gradually increased after these years and increased to 25-30% in 1980s. Today, in most developed countries, 15-25% of all deliveries are performed by caesarean section.¹⁶

Women getting married at a later age than before, getting pregnant at a later age, wanting to have fewer children, presence of infertility problems, infertile women becoming pregnant with treatment, introducing concepts such as 'Risky pregnancy', 'Precious baby', is the factors that increase caesarean rates. In addition, the birth of sequelae children who may be due to birth trauma causes serious legal problems between families and physicians.

Cesarean section was applied in all pregnancies of pregnant women who had caesarean section once. Birth maneuvers are less applied, vaginal delivery has been rarely used in breech delivery. Nowadays, the importance of antenatal prophylaxis can be understood more clearly considering the increasing rates of caesarean delivery.

In our study, when antenatal corticosteroid administration was used in elective caesarean sections over 37 weeks, such as RDS and TNT. We thought that it may cause a decrease in the development of respiratory problems and thus affect mortality and morbidity.

Premature and respiratory problems are the most common causes of mortality and morbidity in newborns. In the literature, routine use of corticosteroids is recommended for delivery before 34 weeks of gestation⁹⁻¹⁰. It was found that corticosteroids decreased RDS and TNT, but also mortality and morbidity and did not cause any side effects in infants in early childhood¹⁷. Many studies have shown that the effect of prenatal betamethasone or dexamethasone to prevent RDS is at the 26th gestational week at the earliest and can be used until the 36th gestational week (2,4). The NIH (National Institute of Health) consensus proposed steroid treatment for all fetuses between 24-34 weeks of gestation at risk of premature birth, according to a 1994 report.¹⁸

Increased risk of maternal infection due to corticosteroid use and changes in immunological response have been reported in some publications. In prospective randomized studies of Morales et al. and Gamsu et al., There was no increase in maternal infection or neonatal sepsis with betamethasone use.^{19,20}

Routine deliveries in the literature before the 34th gestational week corticosteroids have been recommended.^{9,10} However, there is no clear consensus on the use of corticosteroids before elective caesarean section in term pregnant women.

Stutchfield et al.¹¹ were conducted in the UK (Antenatal Steroids for Term Elective Caesarean Section (ASTECS)) and compared prophylactic administration of betamethasone (12 mg x 2, 24 hours apart intramuscular, N = 467 women) versus usual treatment without antenatal corticosteroids (N = 475 women) in women undergoing term elective caesarean section. Women randomised to the treatment group received two intramuscular doses of betamethasone in the 48 hours before delivery, whereas the control group received treatment as usual. Similiar studies (Ahmed et.al, Nada et.al, Nooh et.al),²¹⁻²³ compared prophylactic administration of dexamethasone with placebo or standard care. The Ahmed trial²¹ randomised women undergoing elective caesarean section from 37 + 0 to 39 + 6 weeks to either dexamethasone (12mg x 2, 24 hours apart intramuscular, n=228) at 37 weeks, or standard care without antenatal corticosteroids (n = 224). The Nada trial²² randomised women undergoing elective caesarean section between 38 + 0 and 38 + 6 weeks to either dexamethasone (8 mg x 4, 12 hours apart intramuscular, n = 645) or placebo (normal saline intramuscular, n = 645) 48 hours prior to the operation. The Nooh trial²³ randomised women undergoing planned caesarean section at 38 weeks gestation or beyond to either dexamethasone 8 mg three times at eight hours apart intramuscular, n = 636) 24 hours prior to the operation, whereas the control group (n = 636) received treatment as usual. The overall observed rate of RDS and TNT in the control group was 1.7% and 5.4%, respectively, in the included studies.^{11,21-23} Approximately 3.4% of neonates in the control group were admitted to the neonatal intensive care unit because of respiratory symptoms. Evidence from four randomised controlled trials suggests that prophylactic corticosteroids before elective caesarean section at term may reduce the rates of respiratory distress syndrome (RDS), TNT and admission to neonatal intensive care unit for respiratory morbidity. In this study, postnatal TNT was observed in 2 babies in the group who did not use corticosteroids before elective caesarean section in term pregnant women. Although not statistically significant, the reason was attributed to the low number of patients in the study groups. RDS was not observed in both groups.

Multicentre studies are needed with more patients with corticosteroid administration in elective cesarean section. Nowadays, the increase in maternal mortality and morbidity should be taken into consideration in the face of increasing cesarean rates.

REFERENCES

1. Cotzias CS, Paterson-Brown S, Fisk NM. Obstetricians say yes to maternal request for elective caesarean section: a survey of current opinion. *Eur J Obstet Gynaecol Reprod Biol* 2001; 97: 15-6.
2. Hansen T, Corbet A. Disorders of the transition. In: Taesch HW, Ballard RA (eds): *Avery's diseases of newborn*. 7th edition. Philadelphia: WB Saunders Company;1998. 613-5.
3. Ovalı F. Yenidoğanın geçici taşipnesi. Dağoğlu T (ed). *Neonatoloji*. İstanbul: Nobel Tıp Kitabevi; 2000. 297-8.
4. Tricia Lacy Gomella. Respiratory Distress Syndrome. *Neonatology* 1999; 503-4.
5. Morrison JJ, Rennie JM, Milton PJ. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. *Br J Obstet Gynaecol* 1995;102:101-6.
6. Schatz M, Zeiger RS, Hoffman CP, Saunders BS, Harden KM, Forsythe AB. Increased transient tachypnoea of the newborn in infants of asthmatic mothers. *Am J Dis Child* 1991;145:156-8.
7. Demissie K, Marcella SW, Breckenridge MB, Rhoads GG. Maternal asthma and transient tachypnoea of the newborn. *Pediatrics* 1998; 102: 84-90. 10 Crowley P. Prophylactic corticosteroids for preterm birth. *Cochrane Database Syst Rev* 2000;(2):CD000065.
8. Robert ME, Neff RK, Hubbell JP, Taesch HW, Avery ME. Association between maternal diabetes and the respiratory distress syndrome in the newborn. *N Engl J Med* 1976; 294: 357-60.
9. Royal College of Obstetricians and Gynaecologists Scientific Advisory Committee. RCOG guidelines No 7: antenatal corticosteroids to prevent respiratory distress syndrome. 2nd ed. London: RCOG Press, 2004:1-9.
10. Crowley P, Chalmers I, Keirse MJNC. The effects of corticosteroid administration before preterm delivery: an overview of the evidence from controlled trials. *Br J Obstet Gynaecol* 1990; 97: 11-25.
11. Stutchfield P, Whitaker R, Russell I. Antenatal Steroids for Term Elective Caesarean Section (ASTECS) Research Team. Antenatal betamethasone and incidence of neonatal respiratory distress after elective caesarean section: pragmatic randomised trial. *BMJ* 2005; 331(7518): 662.
12. Creasy RK, Iams JD. Preterm labor and delivery. In: Creasy RK, Resnik R (eds). *Maternal Fetal Medicine* (4th ed). Philadelphia: WB Saunders, 2000: 498-509.
13. Collaborative group on antenatal steroid therapy. Effect of antenatal dexamethasone administration on the prevention of respiratory distress syndrome. *Am J Obstet Gynecol* 1981; 141: 276-87.
14. NIH Consensus Development Conference Statement. Effect of corticosteroids for fetal maturation on perinatal outcomes. *JAMA* 1995; 273: 413-18.
15. Cosmi EV, Anceschi MM. Prevention of fetal and neonatal lung immaturity. In: *Textbook of Perinatal Medicine* (1st ed). Carnforth: The Parthenon Publishing Group Ltd, 1998: 1382-92.
16. Lagrew DC Jr, Morgan MA. Decreasing the cesarean section rate in a private hospital : success without mandated clinical changes . *Am J Obstet Gynecol* 1996; 174: 184-91
17. Kay HH, Bird IM. Kay HH, Bird IM, Coe CL, Dudley DJ. Antenatal steroid treatment and adverse fetal effects: what is the evidence? *J Soc Gynecol Investig* 2000; 7: 269-78.
18. NIH Consensus Development Conference Statement. Effect of corticosteroids for fetal maturation on perinatal outcomes. *JAMA* 1995; 273: 413-18.
19. Morales WJ, Diebel ND, Lazar AJ, Zadrozny D. The effect of antenatal dexamethasone administration on the gestations with premature rupture of membranes. *Am J Obstet Gynecol* 1986; 154: 591-95.
20. Gamsu HR, Mullinger BM, Donnai P, Dash CH. Antenatal administration of betamethasone to prevent respiratory distress syndrome in preterm infants: report of a UK multicentre trial. *Br J Obstet Gynaecol* 1989; 96: 401-10.

21. Ahmed MR, Ahmed WAS, Mohammed TY. Antenatal steroids at 37 weeks, does it reduce neonatal respiratory morbidity? A randomized trial. *Journal of Maternal-Fetal & Neonatal Medicine* 2015;28(12):1486–90.
22. Nada AM, Shafeek MM, El Maraghy MA, Nageeb AH, Salaheldine AS, Awad MH. Antenatal corticosteroid administration before elective caesarean section et term to prevent neonatal respiratory morbidity: a randomized controlled trial. *European Journal of Obstetrics, Gynecology, and Reproductive Biology* 2016; 199: 88–91.
23. Nooh AM, Abdeldayem HM, Arafa E, Shazly SA, Elsayed H, Mokhtar WA. Does implementing a regime of dexamethasone before planned cesarean section at term reduce admission with respiratory morbidity to neonatal intensive care unit? A randomized controlled trial. *Journal of Maternal-Fetal & Neonatal Medicine* 2018; 31(5): 614–20.