Türk Kadın Sağlığı ve Neonatoloji Dergisi

Turkish Journal of Women's Health and Neonatology
e-ISSN: 2717-6622
Mart 2024, Cilt:6 Sayı:1

Türk Kadın Sağlığı ve Neonatoloji Dergisi

Turkish Journal of Women's Health and Neonatology

Publishing Services / Yayıncılık Hizmetleri

Akdema Bilişim Yayıncılık ve Dan. Tic. Ltd. Şti.
Kızılay Mah. Gazi Mustafa Kemal Bulvarı No: 23/8 06420 Çankaya/Ankara
E-posta: bilgi@akdema.com
Tel: 0533 166 80 80
Web: www.akdema.com

Türk Kadın Sağlığı ve Neonatoloji Dergisi
Mart 2024, Cilt: 6, Sayı: 1 Üç Ayda Bir Yayımlanır
Makale gönderim adresi: https://dergipark.org.tr/tr/pub/etlikzubeyde

Türk Kadın Sağlığı ve Neonatoloji Dergisi

Turkish Journal of Women's Health and Neonatology

ADVISORY BOARD / DANIŞMA KURULU

Editorial / Editörden

Çok Değerli Okuyucularımız,

Türk Kadın Sağlığı ve Neonatoloji Dergisi (Turkish Journal of Women's Health and Neonatology) 2024 yılı birinci sayısıyla huzurlarınızdayız. Dergimizde yayınlanan makalelerin yüksek standartlarını korumaktan sorumlu olacak yeni editörümüz Doç. Dr. Müjde Can İbanoğlu'nu tanıtmaktan mutluluk duyuyorum. Bu sayımızda dört özgün araştırma, üç olgu sunumunu zevkle okuyacağınızı ümit ediyoruz.

Polikistik over sendromu (PKOS) reprodüktif çağdaki kadınların yaklaşık %6-19'unda görülen yaygın bir hastalıktır. PKOS Türkiye'de her 5-7 kadından birini etkilemektedir. Menstrüel düzensizlik ve hirsutizm en önemli belirtileridir. PKOS hastaları 4 farklı fenotipte sınıflandırılmaktadır. Bir çalışmada PKOS tanısı alan hastaların klinik ve demografik özellikleri değerlendirilmiştir.

Bir sonraki sayımızda yeni ve ilginç makalelerle buluşmak üzere…

Saygılarımla,
Prof. Dr. Yaprak Üstün
Baş Editör

Türk Kadın Sağlığı ve Neonatoloji Dergisi

Turkish Journal of Women's Health and Neonatology

CONTENTS / İÇİNDEKİLER

Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Tatar ÖB, Erginay ON, Akdaş Reis Y. Clinical and demographic characteristics of patients diagnosed with polycystic ovary syndrome: A cross-sectional observational study. Turk J Womens Health Neonatol 2024; 6(1): 1-7.

Original Article

Clinical and Demographic Characteristics of Patients Diagnosed with Polycystic Ovary Syndrome: A Cross-Sectional Observational Study

Polikistik Over Sendromu Tanısı Alan Hastaların Klinik ve Demografik Özellikleri: Kesitsel Gözlemsel Çalışma

Özde Beren Tatar *[1], Osman Nuri Erginay [1], Yıldız Akdaş Reis [1]

[1] Department of Obstetrics and Gynecology, Ankara Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Ankara, Türkiye

Abstract

Objective: The aim of this study was to investigate the clinical and demographic characteristics of patients diagnosed with polycystic ovary syndrome (PCOS) who were followed up in our hospital.

Material and Methods: We conducted a retrospective, case-controlled observational study of patients treated at the PCOS Clinic of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital between November 2023 and January 2024. The gynecologic history, demographic characteristics, and biochemical parameters of each patient were obtained from the hospital records.

Results: The number of patients who presented to our PCOS outpatient clinic and were enrolled in the study was 48, and the mean age of the patients was 23±5.6 years. The mean body mass index was 26.1± 4.9 kg/m2. The most common reason for presentation to the PCOS outpatient clinic was irregular menstruation (83.3%). The most frequently observed phenotypic group was group A (47.9%). The preferred treatment was lifestyle modification (75.0%), the second most common treatment was oral contraceptives (45.8%).

Conclusion: PCOS is one of the most common endocrine disorders worldwide and can affect women of all ages. In our study, the most common phenotype in our clinic was found to be group A. In addition to oral contraceptives, which are the treatment of first choice, lifestyle changes are also among the treatments used in patients.

Keywords: Phenotype; polycystic ovary syndrome; adolescents; lifestyle changes

Corresponding author *: Department of Obstetrics and Gynecology, Ankara Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Ankara, Türkiye.
Email: ozdeberenyunten@gmail.com
ORCID: 0009-0005-0524-9942
DOI: 10.46969/EZH.1445385
Received: 29.02.2024 Accepted: 05.03.2024

Volume 6 Number 1 p: 1-7

Öz

Amaç: Bu çalışmada polikistik over sendromu (PKOS) tanısı alan ve hastanemizde takipli hastaların klinik ve demografik özelliklerinin değerlendirilmesi planlanmıştır.

Gereç ve Yöntem: Kasım 2023- Ocak 2024 tarihleri arasında Ankara Etlik Zübeyde Hanım Araştırma ve Eğitim Hastanesi PKOS Kliniğinde takip edilen hastalar üzerinde retrospektif vaka kontrollü gözlemsel bir çalışma gerçekleştirdik. Her hastanın jinekolojik öyküsü, demografik özellikleri, biyokimyasal parametreleri hastane kayıtlarından elde edilmiştir.

Bulgular: PKOS polikliniğimize başvurup, çalışmaya dahil edilen hasta sayısı 48'dir. Hastaların yaş ortalaması 23±5.6 yıldır. Vücut kitle indeksi ortalaması 26,1± 4.9 kg/m2'dir. PKOS polikliniğine en sık başvuru nedeni düzensiz menstrüasyondur (83.3%). En sık gözlemlenen fenotipik grup ise A grubudur (47.9%). Kliniğimize başvuran hastalar en çok yaşam tarzı değişikliği tercih etmiştir (75.0%), ikinci en sık tercih edilen tedavi oral kontraseptif kullanımı (45.8%) olmuştur.

Sonuç: PKOS tüm dünyada en sık görülen ve her yaştan kadını etkileyebilen endokrin bozukluklardan biridir. Çalışmamızda kliniğimizde en sık görülen fenotip A grubu olarak bulunmuştur. First line tedavi olan oral kontraseptiflerle birlikte, yaşam tarzı değişşiklikleri de hastalara uygulanan tedavilerimiz arasındadır.

Anahtar Kelimeler: Fenotip; polikistik over sendromu; adölesan; yaşam tarzı değişiklikleri

1. Introduction

Polycystic ovary syndrome (PCOS) is an important problem with a prevalence of 5-10% in women of reproductive age (1). It is an endocrine-metabolic disorder characterized by menstrual irregularities, anovulation, clinical and/or biochemical signs of hyperandrogenism (hirsutism and/or acne), micropolycystic ovaries and metabolic abnormalities (2). Some clinical and laboratory phenotypic features that are not included in the definition criteria for PCOS, but complement the clinical picture and influence the severity and morbidity of the disease, have also been defined (3,4). These include obesity, metabolic abnormalities (insulin resistance/hyperinsulinemia, glucose intolerance/type 2 diabetes mellitus, metabolic syndrome, dyslipidemia), sleep apnea, psychosocial problems and abnormalities in gonadotropin dynamics. The most important factors influencing the phenotype in PCOS are ethnic, racial and other cultural factors. These phenotypic characteristics have similar hereditary structures and cause similar morbidities (5,6). The severity of phenotypic traits also varies widely. Another important significance of phenotypic characteristics is that treatment needs, types of treatment and treatment options differ according to these characteristics. The ovarian dysfunction (OD)+hyperandrogenism (HA)+polycystic ovarian morphology (PCOM) phenotype is considered a complete (classic) phenotype according to the Rotterdam Classification and the highest rate is observed with this phenotype. Other phenotypes according to the Rotterdam criteria can be OD+HA (non-PCO phenotype), HA+PCOM (ovulation phenotype) or OD+PCOM (non-HA phenotype) (phenotype A: HA + OD + PCOM; phenotype B: HA + OD; phenotype C: HA + PCOM and phenotype D: OD + PCOM). According to the Rotterdam criteria (3), endocrine and metabolic abnormalities are lowest in the OD+PCOM group among these 4 different phenotypes. The prevalence and distribution characteristics of metabolic abnormalities (insulin resistance, metabolic disease pattern and glucose intolerance) between phenotypes are not significantly different between the 4 groups (7). Therefore, metabolic abnormalities and distribution characteristics are not used to distinguish the different clinical PCOS phenotypes.

In this group of patients, early diagnosis and treatment of metabolic abnormalities should be emphasized. A balanced diet with lifestyle changes, weight loss and regular exercise are very important for treatment. Antiandrogenic drugs, oral contraceptives and/or metformin, which increases insulin sensitivity, are the basic approaches to drug treatment.

Given this information, the aim of this study was to investigate the clinical and demographic characteristics of PCOS patients who were diagnosed and followed up in our hospital.

2. Material and Methods

We conducted a retrospective, case-controlled observational study of patients treated at the PCOS Clinic of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital in Ankara between November 2023 and January 2024. Approval from the Ethics Committee for Non-Interventional Studies of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital was obtained before the start of the study (Approval date: 28/02/2024 Issue No.: 02/12).

Inclusion criteria for patients in the study: The study group consisted of patients who presented to the PCOS outpatient clinic of our hospital and were diagnosed with PCOS.

The 2003 Rotterdam diagnostic criteria (chronic oligo-/anovulation, clinical/biochemical hyperandrogenism, morphologically multiple small cystic ovaries) were used to diagnose PCOS (8). PCOS was diagnosed if at least two of the three criteria were met.

For the definition of menstrual irregularity;

- Any cycle lasting longer than 90 days after menarche 1 year;
- A cycle of less than 21 days or more than 35 days or less than 8 menstrual cycles per year from the year after menarche 3 until perimenopause.

Menstrual cycles lasting longer than 45 days were termed oligomenorrhea and the absence of menstruation for 3 consecutive cycles was termed amenorrhea.

The severity of hirsutism was assessed using the modified Ferriman-Gallwey system (m FGS), which analyzes the distribution of body hair. Clinical hirsutism was assumed in women with an mFG score above 8.

Total testosterone above 0.75 ng/ml and 1,4-androstenedione above 3 ng/ml were considered biochemical hyperandrogenemia.

Ultrasonography (USG) using a transvaginal 5-megahertz and a transabdominal 3.5-megahertz transducer (Aplio 500; Toshiba, Japan-2015) was performed to diagnose PCOM. The presence of 12 or more follicles with a diameter of 2-9 mm and/or an enlarged ovarian volume (> 10 ml) in one or both ovaries on USG was considered as PCOM. When the exclusion criteria were removed during our follow-up, 48 PCOS patients whose data were accessible, whose consent was obtained and who became pregnant were included.

Identification of phenotype groups: PCOS was categorized into 4 phenotypes.

PHENOTYPE A: HA + OD + PCOM

PHENOTYPE B: HA+OD

PHENOTYPE C: HA+PCOM

PHENOTYPE D: OD+PKOM were grouped as OD+PKOM.

Exclusion criteria: Exclusion criteria for both groups:
1. Patients who were not willing to participate in the study
2. Patients with additional systemic diseases (connective tissue diseases, autoimmune diseases, severe neurological-cardiac and renal diseases, infectious diseases, etc.)
3. Patients taking medications that affect lipoprotein metabolism or insulin release/sensitivity (steroids, anti-inflammatory drugs, etc.)
4. Patients who have already undergone ovarian surgery for any reason
5. Patients with endocrine disorders such as diabetes, Cushing's syndrome, thyroid dysfunction, hyperprolactinemia
6. Foreign patients in order to rule out communication difficulties and ethnic differences

The gynecological history and demographic characteristics of each patient were recorded. A general physical examination and pelvic examination were performed on all patients. Age, body mass index (BMI), waist circumference, blood pressure, fertility characteristics, treatment status, menstrual cycle, Ferriman-Gallwey scores, fasting glucose and insulin levels, serum lipid levels were recorded.

Calculation of BMI: Height and body weight of the patients were measured using professionally calibrated devices. BMI was calculated using the formula BMI = weight (kg)/height (m)2.

Collection of serum samples: Blood samples were collected at the time of diagnosis when the PCOS patients were admitted to the PCOS outpatient clinic. C-reactive protein (CRP) (mg/dL), complete blood analysis, sex hormone-binding globulin (SHBG), free and total testosterone (ng/mL), 17-OH progesterone (mIU/mL), prolactin (ng/mL), thyroid stimulating hormone (TSH) (mIU/mL), androstenedione (mosm/kg), dehydroepiandrosterone sulfate (DHEA-S) (µg/dL), Total cholesterol (mg/dL), high-density lipoprotein (HDL) cholesterol (mg/dL), low-density lipoprotein (LDL) cholesterol (mg/dL), triglycerides (mg/dL), fasting blood glucose, 50 g screening test values were analyzed in the biochemistry laboratory of Ankara Health Sciences College Etlik Zuebeyde Hanım Women's Health Training and Research Hospital. A 'Roche Diagnostic/Cobas 6000e601 Hormone Analyzer', model 2017, was used to determine serum levels of total testosterone and insulin, and a 'Roche Diagnostic Cobas 6000c-5001 Biochemistry Analyzer', model 2012, was used to determine serum lipid, CRP and glucose levels. The Roche Diagnostics / Cobas 6000 eba 1 hormone analyzer (2017) was used to measure basal hormone levels and serum levels of insulin on day 3. Serum levels of DHEA-S, 17-OH-progesterone and testosterone were measured using the radiometric method. The blood count was measured using the Sysmex/XN-1000 i (2016) blood analyzer. Serum levels of DHEA-S, 17-OH-progesterone and free testosterone were measured using a radiomonassay. Serum lipid and glucose levels were analyzed using the AU680 Chemistry System (Beckman Coulter, Fullerton, CA, USA).

Calculation of insulin resistance: A fasting blood glucose level between 100-125 mg/dl was considered as 'impaired fasting glucose'. A Homeostatic Model Assessment Insulin Resistance (HOMA-IR) value of ≥2.5 was defined as insulin resistance. Insulin resistance was calculated using the formula of the

homeostatic model. [HOMA-IR= fasting glucose (mg/dl)xfasting insulin (mIU/mL)/405].

Statistical analysis

All statistical analyzes were performed with the package program SPSS 25.0 (SPSS Inc, Chicago, IL). The Shapiro-Wilk test was used to check the conformity of continuous numerical variables to the normal distribution. Quantitative variables were expressed as mean ± standard deviation, median (minimum-maximum) and qualitative variables as relative frequency (%). The Kruskal-Wallis test was used to compare non-normally distributed parametric variables. For normally distributed variables, a one-way ANOVA was performed between the groups. The Mann Whitney U-test and the Student t-test were used to compare parametric variables in two groups with and without normal distribution, respectively. The Pearson chi-square test was used to compare categorical variables between groups. The P value < 0.05 was considered statistically significant.

Power analysis was performed using the G*POWER 3.1 program to determine the sample size. The power analysis for sample size calculation was based on the previous study by Güngör et al. (9). Participants who met the inclusion criteria were included in the study. According to the 95% confidence (1-α), 95% test power (1-β) and one-tailed t-test analysis of effect size d= 0.9610740 for independent samples, the required sample size was set at 25. Since our number is above this sample size, we assume that the significance of the study is greater than 95%.

3. Results

The number of patients admitted to our PCOS outpatient clinic between November 2023 and January 2024 was 48. The mean age of the patients was 23±5.6 years. The most common applicant group was of reproductive age (18-40 years). The mean body mass index was 26.1± 4.9 kg/m2. These data are shown in Table 1, which describes the demographic characteristics. The most common reason for presentation to the PCOS outpatient

Table 1. Demographic characteristics of patients presenting to the PCOS outpatient clinic

	Study Group N=48
Age (years)	23.2±5.6
Body Mass Index (kg/m^2)	26.1±4.9
Classification by age group n(%)	
Adolescence	18 (37.5%)
Reproductive Age	30 (62.5%)
Menopause	0
Reason for applying n (%)	
Menstrual irregularity	40 (83.3%)
Increased hair growth	31 (64.5%)
Acne	16 (33.3%)
Child counselling	4 (8.3%)
Failure to lose weight	23 (47.9%)
Polycystic ovarian morphology n (%)	
Yes	28 (58.3%)
No	20 (41.6%)
Oligo/anovulation n (%)	
Yes	35 (72.9%)
No	13 (27.0%)
Phenotypes n (%)	
A	23 (47.9%)
B	18 (37.5%)
C	5 (10.4%)
D	2 (4.1%)
The Ferriman-Gallwey score	10.08±2.34

Table 2. Biochemical and laboratory test results of patients attending the PCOS outpatient clinic

Laboratuary measurements (Mean±SD)	Study Group n=48
FSH (m IU/ml)	5.2±2.2
LH (m IU/ml)	13.7±15.7
FSH/LH	0.53±0.3
E2 (pg/ml)	64.7±52.7
TSH (mIU/mL)	2.3±1.09
17-OHP (ng/mL)	0.35±0.23
PRL (ng/mL)	16.5±9.4
DHEAS (ng/L)	259.7±103.6
AMH (ng/mL)	8.1±4.9
Insulin	11.7±7.1
HOMA-IR	2.7±2.0

Mean±SD: Mean±standard deviation, *Student's t-test
FSH: Follicle stimulating hormone, LH: Luteinising hormone, E2: Estrodiol, TSH: Thyroid stimulating hormone, 17-OHP: 17-hydroxyprogesterone, PRL: Prolactin, DHEAS: Dehydroxyepiandrostenedione sulphate, SHBG: Sex hormone binding globulin, AMH: Anti-Müllerian hormone, FAI: Free androgen index.

Table 3. Preferred treatment modalities for patients treated in a PCOS outpatient clinic

	Study Group n=48
Lifestyle changes n (%)	36 (75.0%)
Use of oral contraceptives, n (%)	22 (45.8%)
Antiandrogenic therapy, n (%)	2 (4.1%)
Hair removal techniques, n (%)	4 (8.3%)
Inositol, n (%)	4 (8.3%)
Metformin, n (%)	10 (20.8%)

clinic was irregular menstruation (83.3%). The most frequently observed phenotypic group was group A (47.9%). 72.9% of patients had oligo/novulation and 58.3% had PCOM. The mean FGS score of the patients was 10.08 ± 2.34.

Table 2 shows the biochemical parameters of the included patients. Accordingly, the mean values of the patients were as follows: Follicle Stimulating Hormone (FSH)/Luteinizing Hormone (LH):0.53±0.3; Anti-Muellerian Hormone (AMH):8.1±4.9 ng/ml; Insulin: 11.7±7.1 ng/ml and HOMA-IR values: 2.7±2.0.

Table 3 shows the treatment modalities preferred by the patients according to their presentation at this clinic. Accordingly, the most preferred treatment modality was lifestyle modification (75.0%), the second most preferred treatment was oral contraceptives (45.8%). Treatment with inositol was initiated in four patients (8.3%) and treatment with metformin in 10 patients (20.8%).

4. Discussion

In our study, adolescent and adult PCOS patients were examined with regard to clinical and biochemical parameters. In summary, the incidence in the adolescent group is 37.5% and the most common reason for presentation of the disease is menstrual irregularity. In our outpatient clinic, patients are recommended lifestyle changes together with the contraceptive pill as the primary treatment method.

The Rotterdam criteria published in 2018 are used worldwide for the diagnosis of PCOS. However, it is very difficult to diagnose PCOS in adolescence. This is because PCOS findings resemble normal pubertal physiological changes (irregular menstrual cycles, acne, polycystic ovarian morphology) (10,11).

In 2020, an international consensus on the definition of diagnostic criteria for PCOS in adolescence was published (12). According to this consensus, unexplained persistent ovarian dysfunction (abnormal menstrual pattern according to age or gynecologic age and its persistence for 1-2 years) and clinical/biochemical findings of hyperandrogenism are sufficient for the diagnosis of PCOS in adolescence. Since ultrasonography of polycystic ovaries is very common in this age group, it is not recommended for the diagnosis of PCOS in adolescence (13). In the first 1-4 years after menarche, menstrual irregularities are observed in 25-40% of cases (14). However, since ovulatory dysfunction may persist for several years and hyperendrogenemia (especially acne and hirsutism) may be a finding of the adolescent period, these two criteria may not be sufficient.

In the meta-analysis published by Bozdag et al, hirsutism was found in 13%, hyperandrogenemia in 11%, polycystic ovaries in 28% and oligoanovulation in 15% of women with PCOS (15,16).

AMH levels are elevated in women with PCOS due to an increased number of preantral follicles, but a cut-off value that could serve as a marker for PCOS has not been defined (17,18). This increase could be due to the presence of anovulatory cycles other than PCOS in the adolescent group and the age-related high number of antral follicles.

In the study by de Medeiros et al. (19), acne was found in 45.2% and 39.9% of adolescent and adult PCOS patients, respectively, and hirsutism in 54.8% and 44.3%, respectively. Among the biochemical parameters, DHEAS was significantly higher in adolescent PCOS patients compared to adult PCOS patients (66% and 21.4%, $p < 0.001$). In addition, the mean testosterone level was found to be significantly higher in adolescent PCOS patients (71.9%) than in adult PCOS patients (41.1%). Yuce et al. (20) considered the age group of adolescents as under 18 years old and found that clinical and biochemical hyperandrogenism (free testosterone) was significantly higher in adolescent PCOS patients. Topçu et al. analyzed 25 adolescent PCOS and 25 adult PCOS patients under 18 years of age and found that total testosterone, free testosterone, LH and insulin levels were significantly higher in adolescent PCOS patients (21). In all three studies, AMH levels were not analyzed, PRL levels were similar, and hyperandrogenism was found to be higher in adolescent PCOS patients. In contrast to these studies, another study published in 2021 found no difference in LH/FSH ratio and free testosterone levels in adolescent and adult female PCOS patients (22). In contrast to other studies, our study also examined AMH levels and found that these were higher in adolescent PCOS patients. It is known that LH secretion is increased in PCOS patients due to impaired secretion of gonadotropin-releasing hormone (GnRH) (23). One study suggests that AMH causes an increase in GnRH-dependent LH secretion and thus may play

a role in the etiopathogenesis of PCOS (24). In our study, high AMH levels in adolescence may have caused PCOS to become symptomatic in the early phase.

In studies comparing adolescent and adult PCOS patients, no difference was found between the groups in terms of PRL levels (19-22). The literature reports that an elevated PRL level is not expected in PCOS patients and that if PRL levels> 25 ng/mL, testing for hyperprolactinemia should be performed (25,26).

It is known that 38-88% of women with PCOS are obese and overweight (27). Weight gain during adolescence has been shown to play an important role in the later development of PCOS (28). However, a study published in 2019 reported that an increase in BMI can cause PCOS, but PCOS has no effect on BMI (29). A systemic review and meta-analysis published in 2016 reported that obesity in women with PCOS is lower than assumed and that women with PCOS diagnosed incidentally and without hospitalization have the same prevalence of obesity as the general population (30).

The retrospective design and the fact that metabolic status could not be evaluated in more detail is one of the limiting features of the study, and the lack of grouping of comparative data by age group is a further limitation.

PCOS is one of the most common endocrine disorders worldwide and can affect women of all ages. Although many genetic, environmental and hormonal factors are thought to be responsible, the etiopathogenesis is still not fully understood. In our study, the most common group according to the phenotypic characteristics of the included patients was group A. Our results may shed light on the etiopathogenesis of PCOS. The development of PCOS in adolescence and adulthood could be due to different mechanisms and hormonal changes. Large prospective series of studies are needed to make a definitive statement on this topic.

Author contribution

Study conception and design: ÖBT; data collection: ONE; analysis and interpretation of results: ÖBT and YAR; draft manuscript preparation: ÖBT, ONE and YAR. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital Non-invasive Studies Ethics Committee (Protocol no. 02-12/28.02.2024).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Araştırma fikri ve tasarımı: ÖBT; veri toplama: ONE; sonuçların analizi ve yorumlanması: ÖBT ve YAR; araştırma metnini hazırlama: ÖBT, ONE ve YAR. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için Etlik Zübeyde Hanım Kadın Sağlığı Eğitim ve Araştırma Hastanesi Girişimsel Olmayan Çalışmalar Etik Kurulundan onay alınmıştır (Karar no: 02-12/28.02.2024).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

References

1. Stein IF, Leventhal ML. Amenorrhea associated with bilateral polycystic ovaries. Am J Obstet Gynecol. 1935;29:181. [Crossref]
2. Cannarella R, Condorelli RA, Mongioì LM, La Vignera S, Calogero AE. Does a male polycystic ovarian syndrome equivalent exist? J Endocrinol Invest. 2018;41(1):49-57. [Crossref]
3. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril. 2004;81:19-25. [Crossref]
4. World Health Organization. The second decade: improving adolescent health and development (No. WHO/FRH/ADH/98.18 Rev. 1). 2001. Available at: https://apps.who.int/iris/bitstream/handle/10665/64320/WHO_FRH_?sequence=1
5. Huffman J. Gynecologic problems that beset the adolescent. Contemporary Obstetrics and Gynecolog. 1976;81-7.
6. Christensen SB, Black MH, Smith N, et al. Prevalence of polycystic ovary syndrome in adolescents. Fertil Steril. 2013;100(2):470-7. [Crossref]
7. Recabarren SE, Sir-Petermann T, Rios R, et al. Pituitary and testicular function in sons of women with polycystic ovary syndrome from infancy to adulthood. J Clin Endocrinol Metab. 2008;93(9):3318-24. [Crossref]
8. Teede HJ, Misso ML, Costello MF, et al; International PCOS Network. Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. Hum Reprod. 2018;33(9):1602-18.
9. Güngör ES, Güngör Ş, Zebitay AG. Assessment of semen quality in patients with androgenetic alopecia in an infertility clinic. Dermatologica Sinica. 2016;34(1):10-3. [Crossref]
10. Witchel SF, Oberfield S, Rosenfield RL, et al. The Diagnosis of Polycystic Ovary Syndrome during Adolescence. Horm Res Paediatr. 2015. [Crossref]

11. Ibáñez L, Oberfield SE, Witchel S, et al. An International Consortium Update: Pathophysiology, Diagnosis, and Treatment of Polycystic Ovarian Syndrome in Adolescence. Horm Res Paediatr. 2017;88(6):371-95. [Crossref]

12. Rosenfield RL. Perspectives on the International Recommendations for the Diagnosis and Treatment of Polycystic Ovary Syndrome in Adolescence. J Pediatr Adolesc Gynecol. 2020;33(5):445-7. [Crossref]

13. Screening and Management of the Hyperandrogenic Adolescent: ACOG Committee Opinion, Number 789. Obstet Gynecol. 2019;134:e106-14. [Crossref]

14. Legro RS, Arslanian SA, Ehrmann DA, et al. Diagnosis and treatment of polycystic ovary syndrome: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2013;98(12):4565-92. [Crossref]

15. Bozdag G, Mumusoglu S, Zengin D, Karabulut E, Yildiz BO. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. Hum Reprod. 2016;31(12):2841-55. [Crossref]

16. Azziz R, Carmina E, Dewailly D, et al. Positions statement: criteria for defining polycystic ovary syndrome as a predominantly hyperandrogenic syndrome: an Androgen Excess Society guideline. J Clin Endocrinol Metab. 2006;91(11):4237-45. [Crossref]

17. Dewailly D, Pigny P, Soudan B, et al. Reconciling the definitions of polycystic ovary syndrome: the ovarian follicle number and serum anti-Müllerian hormone concentrations aggregate with the markers of hyperandrogenism. J Clin Endocrinol Metab. 2010;95(9):4399-405. [Crossref]

18. Dewailly D, Gronier H, Poncelet E, et al. Diagnosis of polycystic ovary syndrome (PCOS): revisiting the threshold values of follicle count on ultrasound and of the serum AMH level for the definition of polycystic ovaries. Hum Reprod. 2011;26(11):3123-9. [Crossref]

19. de Medeiros SF, de Medeiros MAS, Barbosa BB, Yamamoto MMW, Maciel GAR. Comparison of metabolic and obesity biomarkers between adolescent and adult women with polycystic ovary syndrome. Arch Gynecol Obstet. 2021;303(3):739-749. [Crossref]

20. Yuce E, Pabuccu R, Keskin M, Arslanca T, Pabuçcu EG. Polikistik Ovary Sendromlu Ergen ve Yetişkin Hastalar Arasındaki Klinik, Endokrinolojik ve Biyokimyasal Farkların Değerlendirilmesi. TJRMS. 2020;4:15-23. [Crossref]

21. Topçu HO, Topçu S, Oskovi A, et al. Comparison of the clinical and laboratory outcomes in adolescent and adults with polycystic ovary syndrome. Jinekoloji-Obstetrik ve Neonatoloji Tıp Dergisi. 2014;11:82-4.

22. Jain S, Jain M, Shukla RC. Correlation of Clinical, Hormonal, Biochemical and Ultrasound Parameters Between Adult and Adolescent Polycystic Ovarian Syndrome: Adult and Adolescent PCOS. J Obstet Gynaecol India. 2022;72(Suppl 1):274-80. [Crossref]

23. Katulski K, Podfigurna A, Czyzyk A, Meczekalski B, Genazzani AD. Kisspeptin and LH pulsatile temporal coupling in PCOS patients. Endocrine. 2018;61(1):149-57. [Crossref]

24. Cimino I, Casoni F, Liu X, et al. Novel role for anti-Müllerian hormone in the regulation of GnRH neuron excitability and hormone secretion. Nat Commun. 2016;7:10055. [Crossref]

25. Filho RB, Domingues L, Naves L, Ferraz E, Alves A, Casulari LA. Polycystic ovary syndrome and hyperprolactinemia are distinct entities. Gynecol Endocrinol. 2007;23(5):267-72. [Crossref]

26. Vilar L, Vilar CF, Lyra R, Freitas MDC. Pitfalls in the Diagnostic Evaluation of Hyperprolactinemia. Neuroendocrinology. 2019;109(1):7-19. [Crossref]

27. Barber TM, McCarthy MI, Wass JAH, Franks S. Obesity and polycystic ovary syndrome. Clin Endocrinol (Oxf). 2006;65(2):137-45. [Crossref]

28. Ollila MM, Piltonen T, Puukka K, et al. Weight Gain and Dyslipidemia in Early Adulthood Associate With Polycystic Ovary Syndrome: Prospective Cohort Study. J Clin Endocrinol Metab. 2016;101(2):739-47. [Crossref]

29. Brower MA, Hai Y, Jones MR, et al. Bidirectional Mendelian randomization to explore the causal relationships between body mass index and polycystic ovary syndrome. Hum Reprod. 2019;34(1):127-36. [Crossref]

30. Ezeh U, Yildiz BO, Azziz R. Referral bias in defining the phenotype and prevalence of obesity in polycystic ovary syndrome. J Clin Endocrinol Metab. 2013;98(6):E1088-96. [Crossref]

Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Tapkan C, Mutlu Sütçüoğlu B, Yılmaz E. Distribution of deliveries according to Robson classification: Experiences in tertiary care. Turk J Womens Health Neonatol 2024; 6(1): 8-14.

Original Article

Distribution of Deliveries According to Robson Classification: Experiences in Tertiary Care

Doğumların Robson Sınıflamasına Göre Dağılımı: Üçüncü Basamak Deneyimi

Canan Tapkan *[1], Bengü Mutlu Sütçüoğlu [1], Elif Yılmaz [1]

[1] Department of Obstetrics and Gynecology, Ataturk Sanatoryum Training and Research Hospital, Ankara, Türkiye

Abstract

Objective: In this study, we aimed to evaluate the cesarean deliveries performed in the obstetrics clinic of our hospital according to the Robson classification and to determine the Robson group affecting the cesarean section rates.

Methods: The aim of the study was to retrospectively analyse caesarean deliveries in patients who applied to Ankara Ataturk Sanatorium Training and Research Hospital and whose deliveries were performed by using the Robson Ten Group Classification System. Our study group included pregnant women who were admitted to the delivery room of our hospital, who gave birth in our hospital and who did not have any obstetric risk factors. Demographic data of the patients were obtained from hospital records.

Results: According to the inclusion criteria, the data of 550 of these patients were evaluated. Accordingly, 249 of the deliveries were by caesarean section. The rate of caesarean section among all deliveries was 45.3%. 6.80% of the pregnant women who delivered by caesarean section were in the first group according to Robson classification (nulliparous, head presentation, ≥37 weeks, singleton, spontaneous onset of trauma) and 12.0% were in the second group according to Robson classification (nulliparous, head presentation, ≥37 weeks, induced or induced caesarean section before the onset of trauma, singleton).

Conclusion: The cesarean section rate in Turkey was 54.4% and the primary cesarean section rate was 26.5%. The risk of maternal morbidity and mortality and perinatal morbidity increases after an off-label caesarean section, leading to negative consequences in terms of maternal, neonatal and economic health.

Keywords: Caesarean section; Robson classification; Turkey; birth rates

Corresponding author *: Department of Obstetrics and Gynecology, Ataturk Sanatoryum Training and Research Hospital, Ankara, Türkiye.
Email: cananuzun06@hotmail.com
ORCID: 0000-0002-0849-0281
DOI: 10.46969/EZH.1445030
Received: 29.02.2024 Accepted: 06.03.2024

Öz

Amaç: Bu çalışma ile hastanemiz doğum kliniğinde gerçekleşen sezaryan doğumlarının Robson sınıflandırmasına göre değerlendirmeyi ve sezaryan oranlarına etki eden Robson grubunu tesbit etmeyi amaçladık.

Gereç ve Yöntem: Çalışma, retrospektif olarak Ankara Ataturk Sanatoryum Eğitim ve Araştırma Hastanesine başvurmuş ve doğumunu gerçekleştirdiğimiz hastalarda sezaryen doğumların Robson On Gruplu Sınıflandırma Sistemi kullanılarak analiz edilmesi amaçlanmıştır. Çalışma grubumuz hastanemiz doğum salonuna kabul edilmiş, hastanemizde doğum yapmış olan ve herhangi bir obstetrik risk faktörü olmayan gebeleri kapsamaktadır. Hastaların demografik verileri hastane kayıtlarından alınmıştır.

Bulgular: Çalışmaya dahil olma kriterlerine göre bu hastaların 550'ine ait veriler değerlendirmeye alınmıştır. Buna göre, doğumların 249'u sezaryen doğum ile gerçekleşmiştir. Tüm doğumlar içerisinde sezaryen doğum oranı %45.3'dür. Sezaryen ile doğum gerçekleştiren gebelerin 6.80%'lik kısmı Robson sınıflandırmasına göre birinci grupta (Nullipar, baş geliş, ≥37 hafta, tekil, travayı spontan başlamış), 12.0%'si Robson sınıflandırılmasında ikinci grupta (nullipar, baş geliş, ≥37 hafta, indüklenmiş ya da travay başlamadan önce sezaryen yapılmış, tekil) yer almıştır.

Sonuç: Türkiye geneli sezaryen doğum oranı %54,4 ve primer sezaryen doğum oranı %26.5'dır. Endikasyon dışı sezaryen doğum sonrasında maternal morbidite ve mortalite ile perinatal morbidite riski artmakta ve bu durum hem anne hem yenidoğan sağlığı hem de ekonomik açıdan olumsuz sonuçlara yol açmaktadır.

Anahtar Kelimeler: Sezaryan doğum; Robson sınıflandırması; Türkiye; doğum oranları

1. Introduction

Cesarean section is one of the most commonly performed surgical procedures worldwide and is defined as the delivery of the fetus through an abdominal incision followed by a uterine incision (1). A cesarean section is usually performed when vaginal delivery cannot be performed safely and there is an increased risk of morbidity and mortality for the mother and/or baby. Since 1985, the international health community has assumed that the ideal cesarean section rate should be 10-15% of all deliveries. Today, the incidence of cesarean sections is increasing rapidly worldwide, particularly in middle- and high-income countries (2,3).

The number of deliveries by cesarean section is gradually increasing in our country as in the whole world, and one of the main reasons for this increase is elective cesarean sections, which are performed according to the motto "once a cesarean section, always a cesarean section". Vaginal delivery after cesarean section is now practiced in many countries and the standards for vaginal delivery after cesarean section in our country are set out in the 2010 Department of Health guidelines for the management of childbirth and cesarean section.

As with any surgical procedure, there are short and long-term risks following a cesarean section. Studies have shown that a cesarean section rate of over 10% is not associated with a reduction in maternal and neonatal mortality (4). The cesarean section rate has been gradually increased over the last decade and it is an important but difficult issue to uncover the reasons for this increase, to determine the cesarean section rate and to calculate the lowest cesarean section rate when necessary by avoiding medically unnecessary interventions.

The World Health Organization (WHO) has proposed an internationally applicable, clinically valid and meaningful Robson's Ten Group Classification System (ROGSS) to reduce cesarean section rates. This classification system is prospective and eliminates controversial situations that are uncertain in cesarean section decisions. The classification categorizes pregnant women into 10 different groups based on 5 basic obstetric parameters derived from prenatal, intrapartum and postnatal data. These parameters are parity (nulliparous, multiparous), previous cesarean sections, onset of labor (spontaneous, induced or preterm), duration of pregnancy (preterm or term), fetal position (cephalic, breech or transverse) and number of fetuses (single or multiple). The classification, which is objective, reproducible, easy to understand and suitable for clinical use, helps to compare cesarean section rates and determine the factors that cause cesarean section (5,6). The number of cesarean deliveries is gradually increasing in our country as in the whole world, and one of the most important reasons for this increase is elective cesarean deliveries, which are performed according to the motto "once a cesarean, always a cesarean". Vaginal birth after cesarean section is now used in many countries, and the standards for vaginal birth after cesarean section were established in our country in 2010 in the Ministry of Health's Guide to the Management of Births and Cesarean Sections.

The aim of this study was to evaluate the cesarean deliveries performed in the Obstetrics and Gynecology Clinic of our hospital according to the Robson classification and to determine the Robson group that affects cesarean section rates.

2. Materials and Methods

We conducted a retrospective, case-controlled observational study of patients who were cared for and delivered at the Ankara Ataturk Sanatorium Research and Teaching Hospital Obstetrics Clinic. The ethics committee for non-interventional studies of Ankara Ataturk Sanatorium Research and Teaching Hospital gave its approval before the start of the study (approval date: 28/02/2024, issue no.: 38/2024).

The aim of the study was to retrospectively analyze cesarean deliveries in patients who were registered at Ankara Ataturk Sanatorium Training and Research Hospital and whose deliveries were performed according to the Robson Ten Group Classification System. Our study group included pregnant women who were admitted to the delivery room of our hospital, who delivered in our hospital and who had no obstetric risk factors. Patients with fetal anomalies, diagnosis of chronic disease in the mother, dead fetuses, abnormalities of the placenta, maternal age less than 22 and more than 49 years, pregnancy with assisted reproductive technology, smoking history, and patients admitted to the hospital and referred for delivery were excluded. Thus, 632 records from the last year were analyzed (Figure 1).

The patients' data were analyzed using the delivery records and the hospital information system. The data were collected using the list of patients and delivery methods from the delivery records, the characteristics recorded in the hospital information system (demographic characteristics, life history, family history, follow-up characteristics) and the information in the delivery records. Patients were categorized according to the Robson On classification (Table 1) (6).

Statistical analysis

All statistical analyzes were performed using the SPSS 25.0 package program (SPSS Inc, Chicago, IL). The Shapiro-Wilk test was used to check the conformity of continuous numerical

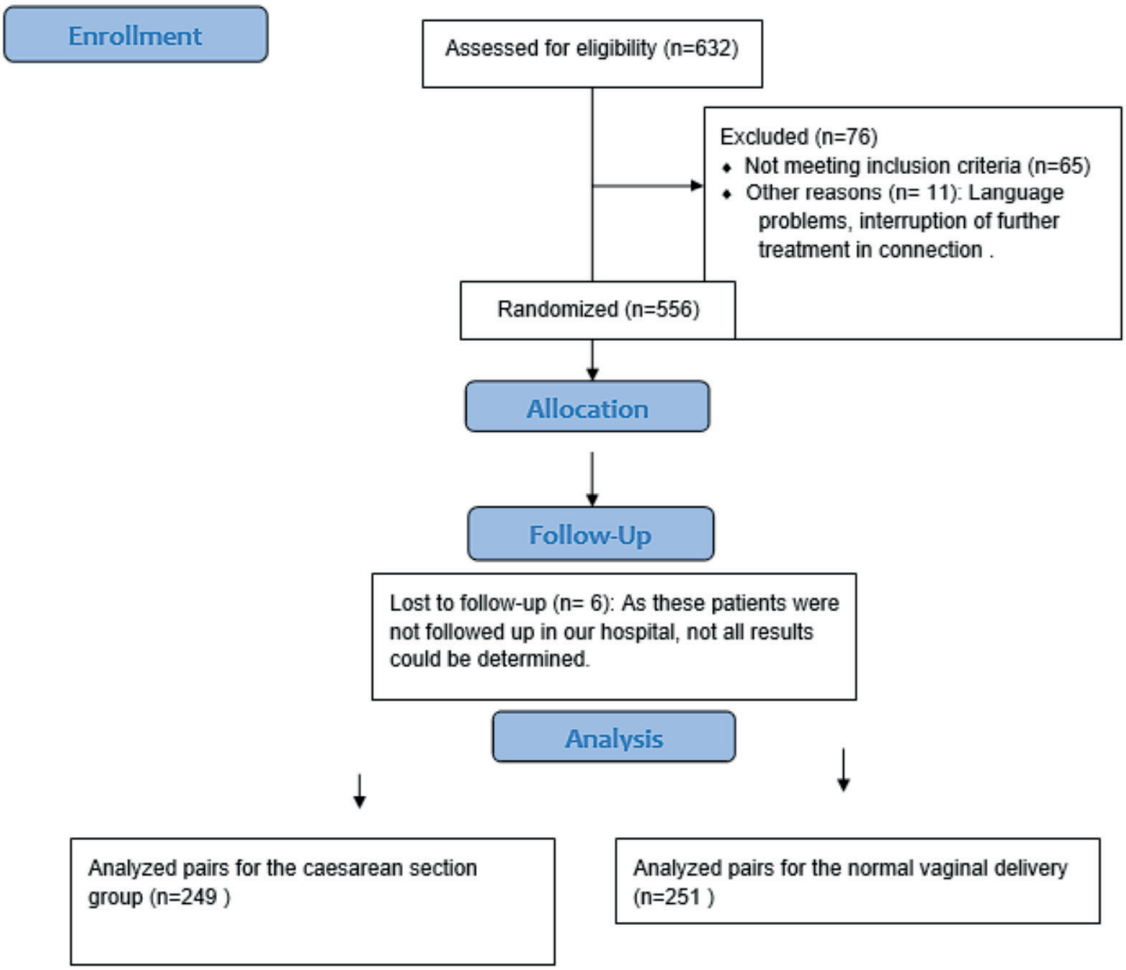


Figure 1. Flow chart of the study

Table 1. Description of Robson Classification	
Groups	Description
Group 1	Nulliparous, single cephalic, ≥37 weeks, spontaneous labor
Group 2	Nulliparous, single cephalic, ≥37 weeks, induced or cesarean before labor
Group 3	Multiparous (excluding previous cesareans), single cephalic, ≥37 weeks, spontaneous labor
Group 4	Multiparous (excluding previous cesareans), single cephalic, ≥37 weeks, induced or cesarean before labor
Group 5	Previous cesarean, single cephalic ≥37 weeks
Group 6	All nulliparous breeches
Group 7	All multiparous breeches (including previous cesareans)
Group 8	All multiple pregnancies (including previous cesareans)
Group 9	All abnormal lies (including previous cesareans)
Group 10	All single cephalic, ≤36 weeks (including previous cesareans)

variables to the normal distribution. Quantitative variables were expressed as mean ± standard deviation, median (minimum-maximum) and qualitative variables as relative frequency (%). The Kruskal-Wallis test was used to compare non-normally distributed parametric variables for the three groups. For normally distributed variables, a one-way ANOVA was performed to compare between groups. The Mann Whitney U-test and Student t-test were used to compare parametric variables in two groups with and without normal distribution, respectively. The Pearson chi-square test was used to compare categorical variables between groups. The P-value < 0.05 was considered statistically significant.

3. Results

The study analyzed data from 632 deliveries. In accordance with the inclusion criteria, data from 550 of these patients were analyzed. Accordingly, 249 of the deliveries were performed by cesarean section. The cesarean section rate among all deliveries was 45.3 % (Table 2). The demographic data of the patients included in the study are listed in Table 3. The average age of the patients was 23.2±5.6 years. The body mass index was 26.1±4.9 kg/m^2. Of the patients included in the study, 145 (26.3%) gave birth for the first time. 65 (11.8%) of the patients had given birth before the 37th week of pregnancy.

According to the Robson classification, 6.80% of pregnant women who had delivered by cesarean section belonged to the first group (nulliparous, cephalic, ≥37 weeks, singleton delivery, spontaneous onset of trauma) and 12.0% to the second group (nulliparous, cephalic, ≥37 weeks, induced or cesarean section before onset of trauma, singleton delivery) (Table 4). 5.60% of pregnant women who delivered by cesarean section belonged

Table 2. Distribution of all deliveries in our clinic		
Type of delivery	Number	Percentage
Vaginal delivery	301	54.7%
Cesarean section	249	45.3%
Total	550	100.0%

Table 3. Demographic characteristics of patients	
	Study Group N=550
Age (years)	23.2±5.6
Body Mass Index (kg/m^2)	26.1±4.9
Parity	
0	145 (26.3%)
1	326 (59.4%)
≥ 2	79 (14.3%)
Smoking	
Yes	157 (28.5%)
No	398 (72.4%)
Assisted reproductive techniques	
Yes	11(2.0%)
No	539 (98.0%)
Gestational week at delivery	
< 37 weeks	65 (11.8%)
37-42 weeks	476 (86.5%)
>42 weeks	19 (2.7%)

Table 4. Distribution of birth types according to the Robson Ten Group Classification System						
Robson Group	Normal deliveries (n)	Percentage (%)	Cesarean section (n)	Percentage (%)	Total (n)	Percentage (%)
Group 1	55	18,30%	17	6,80%	72	13,10%
Group 2	21	7.00%	30	12.00%	51	9.30%
Group 3	139	46.20%	14	5.60%	153	27.80%
Group 4	54	17.90%	7	2.80%	61	11.10%
Group 5	0	0.00%	119	47.80%	119	21.60%
Group 6	0	0.00%	10	4.00%	10	1.80%
Group 7	0	0.00%	10	4.00%	10	1.80%
Group 8	0	0.00%	6	2.40%	6	1.10%
Group 9	0	0.00%	3	1.20%	3	0.05%
Group 10	32	10.60%	33	13.30%	65	11.80%

to the third group [multiparous (no previous cesarean section), cephalic, singleton, ≥37 weeks, spontaneous onset of trauma] and 2.80% belonged to the fourth group [multiparous (no previous cesarean section), cephalic, ≥37 weeks, induced or induced cesarean section before onset, singleton] according to the Robson classification. The proportion of group 5 (previous cesarean, cephalic, singleton, ≥37 weeks' gestation), group 6 (all nulliparous breech deliveries), and group 7 (all multiple breech deliveries, including previous cesarean) among all cesarean deliveries was 47.80%, 4.0%, and 4.0%, respectively. According to Robson's classification, group 9 (all transverse presentations, including previous cesarean sections) accounted for 2.40% of all cesarean births.

4. Discussion

In our one-year study, in which 45.3% of deliveries in our hospital's training clinic were cesarean sections and 632 deliveries were analyzed, cesarean section rates were assessed using the Robson Ten Group Classification System (7). The World Health Organization recommends a cesarean section rate between 10% and 15% in health facilities (8). According to the Turkish Health Statistics data (2019), the cesarean section rate in Turkey was 54.4% and the primary cesarean section rate was calculated as 26.5% (9). The risk of maternal morbidity and mortality and perinatal morbidity increases after an unwanted cesarean section, which has negative consequences for maternal and neonatal health and the economy (10).

To increase the number of normal vaginal deliveries and reduce the cesarean section rate, it is necessary in our country to wait for the spontaneous onset of labor (reduction of induction), increase the use of the partograph, avoid continuous electronic fetal monitoring in low-risk pregnant women, manage labor spontaneously, and provide one-to-one care by midwives and nurses for normal labor motivation. Spontaneous labor management carries fewer risks than interventions during labor

To achieve the cesarean section rates recommended by the WHO, the Robson Ten-Group Classification System must be managed effectively. This classification system makes it possible to categorize pregnant women into groups according to their obstetric characteristics, to compare cesarean section rates between the groups and to determine the components that lead to a cesarean section. Group 5 (previous uterine surgery) is the largest contributor to cesarean section rates, and reducing primary cesarean section rates can be seen as the most important step in reducing cesarean section rates. In breech and multiple pregnancies, vaginal delivery should be attempted under appropriate conditions, the rate of operative vaginal deliveries should be increased, indications such as fetal distress, non-progressing labor, craniopelvic incompatibility should be based on clearer and more objective criteria.

In all studies on indications for cesarean section, previous uterine surgery was mentioned as the most important indication (11). In our study, the most common indication for cesarean section was previous uterine surgery, accounting for 47.8% of all cesarean sections (group 5).

Although it has been reported that vaginal delivery is possible for patients who have previously undergone cesarean section through a transverse lower segment incision in centers that provide the conditions for monitoring during active labor and performing cesarean section under emergency conditions if they have appropriate pelvic anatomy and the fetus weighs

less than 4000 grams, the possibility of vaginal delivery after cesarean section remains limited in our country due to medico-legal concerns (12).

In our study, the cesarean section rate in group 1 was 6.80%. In a study conducted in our country in 2023, the cesarean section rate in Robson's group 1 was 21.31% (13). One of the most common indications for primary cesarean section is fetal distress, and with the increase in electronic fetal monitoring, an increase in the cesarean section rate has been observed (14). Some studies have shown that continuous electronic fetal monitoring in low-risk pregnancies does not provide any additional benefit in terms of perinatal mortality and morbidity, but on the contrary increases the cesarean section rate (15). Careless and inadequate fetal monitoring in an attempt to reduce the increase in cesarean section rate may also lead to poor obstetric outcomes.

Encouraging expectant mothers to have a vaginal delivery, making antenatal education a routine part of regular antenatal care, informing them about the advantages and disadvantages of vaginal delivery and cesarean section, and ensuring that they have sufficient knowledge about delivery will play an important role in reducing the rate of cesarean sections at the request of mothers. In most industrialized countries where the cesarean section rate is low, optimal prenatal care is offered and women receive skilled and high quality care, follow-up, education and counseling from prenatal care to the postpartum period. This approach contributes significantly to keeping the cesarean section rate at the level recommended by the WHO. Our clinic provides the necessary training and precautions in this regard, and our postnatal patients are informed about delivery.

Due to the recent increase in malpractice lawsuits, obstetricians and gynecologists in particular prefer C-sections, which are easier and less risky. It was found that a significant majority of women suffered from labor pain and anxiety because they were not adequately informed and therefore preferred a C-section.

Excessive obesity, advanced age pregnancies, systemic diseases, dietary changes and reduced physical activity increase the risk of high-risk pregnancies and affect the rates of cesarean section due to systemic causes and dystocia.

In our country, many different institutions and associations, especially the Ministry of Health, carry out various activities to reduce the cesarean section rate during the labor process, and the Robson Ten Group Classification System is routinely used to classify cesarean sections (7). In Turkey, as in the rest of the world, the rate of cesarean sections is increasing due to the expectant mother's belief that a cesarean section is safer, the medical profession's belief that the expectant mother and baby are exposed to fewer risks during a cesarean section, the development of technology and surgical techniques, the use of antibiotics and blood transfusions, and the increase in the safety of anesthesia methods. Further research is needed to determine the rate of cesarean sections in Turkey and the factors affecting this rate. In our country, health records should be kept in more detail and all health movements and records of the population served by primary care should be recorded in more detail and these records should be used to improve cesarean section rates. By using the Robson Ten Group Classification System in monitoring cesarean section rates, both developing and developed countries can easily analyze their countries and make decisions on a country-by-country basis to achieve the target cesarean section rate.

Author contribution

Study conception and design: CT, BMS and EY; data collection: CT, BMS and EY; analysis and interpretation of results: CT, BMS and EY; draft manuscript preparation: CT, BMS and EY All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Ethics Committee for Noninterventional Studies of Ankara Ataturk Sanatoryum Research Hospital (Protocol no. 38/2024 28/02/2024).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Araştırma fikri ve tasarımı: CT, BMS ve EY; veri toplama: CT, BMS ve EY; sonuçların analizi ve yorumlanması: CT, BMS ve EY; araştırma metnini hazırlama: CT, BMS ve EY. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için Ankara Atatürk Sanatoryum Eğitim ve Araştırma Hastanesi Etik Kurulundan onay alınmıştır (Karar no: 38/2024 28/02/2024).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

References

1. Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, et al. Cesarean delivery and peripartum hysterectomy. In: Williams Obstetrics. 24th ed. New York McGraw Hill Education; 2014: 587-606.
2. T.C. Sağlık Bakanlığı Ana Çocuk Sağlığı ve Aile Planlaması Genel Müdürlüğü. Doğum ve Sezaryen Eylemi Yönetim Rehberi. Ankara: Damla Matbaacılık; 2010.
3. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. BMJ Glob Health. 2021;6(6):e005671. [Crossref]
4. Rudey EL, Leal MDC, Rego G. Cesarean section rates in Brazil: Trend analysis using the Robson classification system. Medicine (Baltimore). 2020;99(17):e19880. [Crossref]
5. Yalçin SS, Boran P, Tezel B, et al. Effects of the COVID-19 pandemic on perinatal outcomes: a retrospective cohort study from Turkey. BMC Pregnancy Childbirth. 2022;22(1):51. [Crossref]
6. Robson M. The Ten Group Classification System (TGCS) - a common starting point for more detailed analysis. BJOG. 2015;122(5):701. [Crossref]
7. Ünsal M, Zorlu U, Aktemur G, et al. Sezaryen Oranlarının Robson On Grup Sınıflandırılması İle Değerlendirilmesi: Sezeryan Oranları Azaltılabilir Mi? Hitit Medical Journal. 2023;5(3):185-9. [Crossref]
8. World Health Organization (WHO).WHO statement on caesarean section rates. WHO; 2015.
9. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. 2018 Türkiye Nüfus ve Sağlık Araştırması. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı ve TÜBİTAK, Ankara; 2019.
10. Vogel JP, Pingray V, Althabe F, et al. Implementing the WHO Labour Care Guide to reduce the use of Caesarean section in four hospitals in India: protocol and statistical analysis plan for a pragmatic, stepped-wedge, cluster-randomized pilot trial. Reprod Health. 2023;20(1):18. [Crossref]
11. Topçu HO, Özel Ş, Üstün Y. Identifying strategies to reduce cesarean section rates by using Robson ten-group classification. J Matern Fetal Neonatal Med. 2021;34(16):2616-22. [Crossref]
12. ACOG Practice bulletin no. 115: Vaginal birth after previous cesarean delivery. Obstet Gynecol. 2010;116(2 Pt 1):450-63. [Crossref]
13. Buhur A, Erdem D. Changing trends in cesarean section deliveries in a tertiary hospital using the Robson Ten Group Classification. Journal of Contemporary Medicine. 2023;13(2):301-14 [Crossref]
14. Abuduxike G, Cali S, Vaizoğlu SA, et al. An Analysis of the Mode of Delivery, Risk Factors, and Subgroups with High Caesarean Birth Rates Using Robson Classification System. Matern Child Health J. 2023. [Crossref]
15. Devane D, Lalor JG, Daly S, McGuire W, Cuthbert A, Smith V. Cardiotocography versus intermittent auscultation of fetal heart on admission to labour ward for assessment of fetal wellbeing. Cochrane Database Syst Rev. 2017;1(1):CD005122. [Crossref]

To cite this article: Akkuş ZC, Yücel Çelik Ö, Karadeniz RS. How often do we discover an abnormality of the uterus at delivery? Single center experience. Turk J Womens Health Neonatol 2024; 6(1): 15-19.

Original Article

How Often Do We Discover an Abnormality of The Uterus at Delivery? Single Center Experience

Uterin Bir Anormalliği Ne Sıklıkla Doğum Sırasında Keşfediyoruz? Tek Merkez Deneyimi

Zeki Cihad Akkuş *[1], Özge Yücel Çelik [1], R. Sinan Karadeniz [1]

[1] Department of Obstetrics and Gynecology, Ankara Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Ankara, Türkiye

Abstract

Objective: In this study, we aimed to determine the incidence of incidental uterine anomalies in the patient population who gave birth in our centre and to evaluate the perinatal outcomes.

Methods: We conducted a retrospective analysis of outcomes of patients with incidental uterine anomalies who delivered at a tertiary care center between January 2023 and December 2023. Patient data were obtained by searching hospital records.

Results: The data of 782 pregnant women who had given birth in the last eleven months were analyzed retrospectively. Three patients were found who could be included in the classification of uterine anomaly and who had not received prior diagnosis and treatment. The mean age was 30.0 years and the mean body mass index was 25.6 kg/m^2. The mean gestational age of the patients was 37+0 weeks.

Conclusion: In this study, we found uterine abnormalities in 3 patients during cesarean delivery. It is important to note that these uterine abnormalities correlate least with pregnancy complications or fertilization success.

Keywords: Congenital uterine anomalies; malpresentation; miscarriage; Müllerian anomalies; birth

Öz

Amaç: Bu çalışma ile merkezimizde doğum yapan hasta popülasyonunda insidental uterin anomali insidansını belirlemek ve perinatal sonuçlarını değerlendirmeyi amaçladık.

Gereç ve Yöntem: Ocak 2023 ile Aralık 2023 tarihleri arasında üçüncü basamak bir merkezde doğum yapan ve tesadüfi uterin anomalisi olan hastaların sonuçları retrospektif olarak analiz edilmiştir. Hastaların verileri hastane kayıtları taranarak tespit edilmiştir.

Bulgular: Son on bir ay içinde doğum yapmış 782 gebenin verileri retrospektif olarak analiz edildi. Uterin anomali sınıflamasına dahil edilebilecek ve daha önce tanı ve tedavi almamış üç hasta bulundu. Ortalama yaş 30.0 yıl ve ortalama vücut kitle indeksi 25.6 kg/m^2 idi. Hastaların ortalama gebelik yaşı 37+0 hafta idi.

Sonuç: Bu çalışmada, sezaryen doğum sırasında 3 hastada uterus anomalileri saptadık. Bu uterus anormalliklerinin gebelik komplikasyonları veya fertilizasyon başarısı ile en az korelasyon gösterdiğine dikkat etmek önemlidir.

Anahtar Kelimeler: Konjenital uterus anomalileri; malprezentasyon; düşük; Müllerian anomalileri; doğum

Corresponding author *: Department of Obstetrics and Gynecology, Ankara Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Ankara, Türkiye.
Email: drcihad42@gmail.com
ORCID: 0009-0006-5142-207X
DOI: 10.46969/EZH.1442545
Received: 24.02.2024 Accepted: 29.02.2024

Volume 6 Number 1 p: 15-19

1. Introduction

Congenital malformations of the female reproductive tract affect about 5.5 to 7% of girls (1). Although some of these malformations are asymptomatic and may go unnoticed, obstructive malformations cause a variety of symptoms that manifest as early as the onset of puberty (2). The etiology of congenital malformations is still unclear and the effects of genetic and environmental factors are currently being analyzed. Animal studies suggest the presence of genetic mutations that may lead to arrest or maldevelopment of the female reproductive tract during fetal life (3). The lower genital tract arises from both the urogenital sinus and the mullerian duct: the lower vagina and hymen arise from the urogenital sinus, while the fallopian tube, uterus, cervix and upper vagina arise from the mullerian duct. During fetal life, the vaginal plate grows at the fused end of the mullerian duct and then joins the urogenital sinus as the tuberous sinus. Due to their common embryologic origin, anomalies of the mullerian duct may be associated with anomalies of the urinary tract (4).

Due to the heterogeneity of congenital anomalies of the reproductive system, different classification systems have been proposed. The American Society of Reproductive Medicine (ASRM) classification system is one of the most widely accepted classifications: Mullerian anomalies are divided into six categories based on the degree of disruption to normal development. However, some rare anomalies may not fit into one of the ASRM categories (5). For these rare anomalies, the European Society of Human Reproduction and Embryology/ European Society for Gynecologic Endoscopy Consensus (ESHRE/ESGE) classification system for female genital anomalies is used (6).

The aim of this study was to determine the incidence of incidental uterine anomalies in the population of patients delivering at our center. Secondarily, we wanted to assess the perinatal outcome of incidental uterine anomalies.

2. Materials and Methods

For our retrospective cross-sectional observational study, patients with incidental uterine anomalies who delivered at University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital between January 1, 2023 and December 1, 2023 were analyzed. Patients who agreed to participate in the study and whose treatment was continued in our hospital were included in the study. The patients' data were analyzed retrospectively from the patient record system. We analyzed 782 patients whose demographic data we could access and whose delivery took place in the maternity ward of

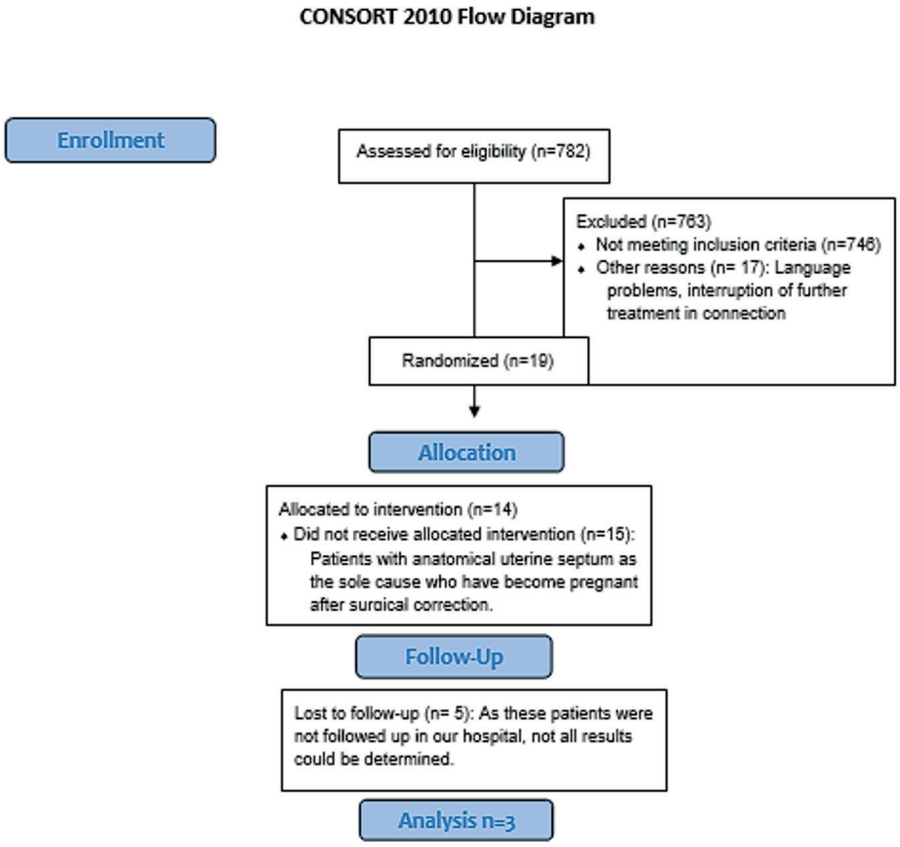


Figure 1. Flow diagram of the study

our hospital. The study protocol was approved by University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital Medical Speciality Education Board (Decision No.: 11/11 on 23/11/2023). All participants signed a written and verbal informed consent form and the principles of the Declaration of Helsinki were followed. Demographic characteristics, maternal age, gestational age, parity, concomitant anomalies and consanguinity were obtained from hospital records.

Exclusion criteria were known uterine anomalies, previous uterine surgery and inaccessibility of medical records. According to the classification system updated by the European Society of Human Reproduction and Embryology (ESHRE) and the European Society of Gynecological Endoscopy (ESGE) as part of the Delphi process, patients with uterine anomalies discovered incidentally during delivery at our tertiary center were included in the study (6). Accordingly, uterine anomalies were incidentally detected in 3 patients in 11 months at our center (Figure 1).

Uterine anomalies are categorized into seven main types based on anatomical deviations from the same embryological origin: U0, normal uterus; U1, dysmorphic uterus (infantile or T-shaped); U2, septate uterus; U3, bicorporeal uterus (bicornuate and didelphys); U4, hemi-uterus (unicornuate); U5, aplastic uterus; U6 is defined for unclassified cases (6).

Statistical analysis

SPSS 20 (IBM Corp. published 2011. IBM SPSS Statistics for Windows, version 20.0, Armonk, NY: IBM Corp.) was used to analyze the data. The data were analyzed using visual (histograms, probability plots) and analytical methods (Kolmogorov–Smirnov/ Shapiro–Wilk tests) to determine their normal distribution. A one-way ANOVA and the Kruskal–Wallis test were used to compare continuous variables with normal and non-normal distributions, respectively. The relationships between categorical variables were analyzed using a chi-square test. A p-value < 0.05 was considered an indication of statistical significance.

3. Results

The data of 782 pregnant women who had given birth in the last eleven months were analyzed retrospectively. Three patients were found who could be included in the classification of uterine anomaly and who had not received prior diagnosis and treatment. The demographic characteristics of the patients are shown in Table 1. The mean age was 30.0 years and the mean body mass index was 25.6 kg/m^2. The mean gestational age of the patients was 37+0 weeks.

Table 1. Demographic characteristics of the study group

Characteristics	Study Group n=3
Age (years)	30.0 ± 5,48
Gravida (min-max)	3 (1-3)
Parity (min-max)	2 (0-2)
Living births (n)	2 (0-2)
Previous birth (n, %)	
None	1 (33.3%)
Vaginal delivery	2 (67.7%)
Ceserean section	0
Weeks of gestation (weeks)	37.22 ± 1.46
Body mass index (kg/m^2)	28.8 ± 4.45
Smoking (n, %)	
No	3 (100%)
Yes	0
Birth weight (grams)	2985.36 ± 245.80

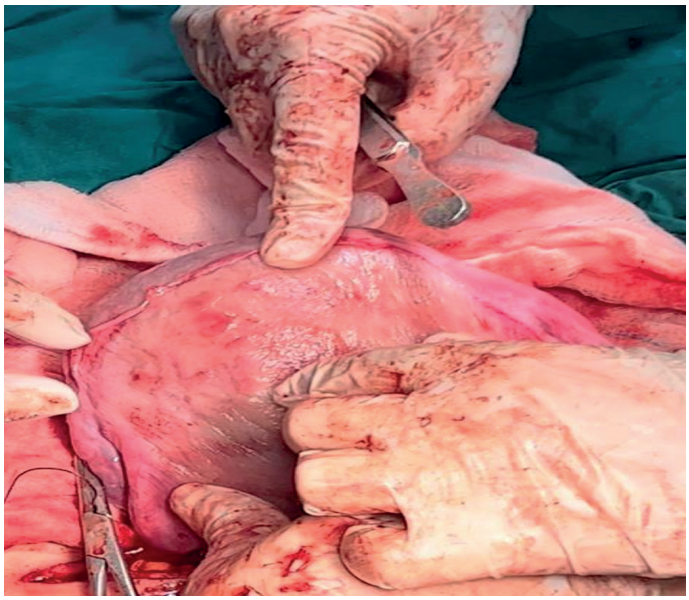


Figure 2. An image of a uterine anomaly discovered during surgery

The number and percentage of patients are shown in Table 2. Accordingly, one of the 3 patients was found to have a uterine septum, one patient had a bicornuate uterus and one patient had a fibrotic band on the uterus (Figure 2). All patients were admitted to our hospital in labor and a cesarean section was decided in all of them due to fetal distress during labor. In all of these patients, labor started in the latency phase. In all cases, labor was in the vertex presentation. No additional uterine anomaly was detected. The postpartum ultrasound examination

revealed no abnormalities of the urinary tract. All patients were delivered by cesarean section. All babies were born weighing less than 3000 grams. None of the babies were admitted to the neonatal unit. No assisted reproduction methods were used in any of the patients. Anemia was diagnosed as a postnatal complication in only one mother. The patient received 1 unit of erythrocyte suspension as a replacement.

Table 2. Perinatal clinical characteristics of the study population

	Study Group n=3
Type of uterine anomaly (n, %)	
Septum (n)	1 (33.3%)
Bicornu (n)	1 (33.3%)
Fibrotic ligament (n)	1 (33.3%)
In vitro fertilization (n, %)	0
Way of delivery (n, %)	
Vaginal delivery	0
Ceserean section	3 (100%)
Cause of caesarean section (n, %)	
Fetal distress	3 (100%)
Cephalopelvic discordance	0
Breech presentation	0
Fetal macrosomia	0
Non-progressive labor	0
Other uterine anomaly (n, %)	
No	3 (100%)
Yes	0
Urinary anomaly (n, %)	
No	3 (100%)
Yes	0
Admission to the neonatal intensive care unit (n, %)	
No	3 (100%)
Yes	0
Maternal complications (n, %)	
Postpartum haemorrhage	0
Hysterectomy	0
Re-operation	0
Infection	0
Blood transfusion	1 (33.3%)

4. Discussion

The female reproductive tract develops from the mullerian ducts, which form on both sides and are completed around the 12th to 14th week of pregnancy (7). When fusion is complete, canalization and absorption of the medial part leads to the formation of a normal uterine cavity and vagina. A defect in the fusion of the Muellerian ducts leads to many abnormalities of the uterus. The actual prevalence of congenital anomalies of the uterus in the population is generally unknown. It is estimated to be about 3.5 percent, which means that they occur in about one in 30 women (1). The most common uterine abnormality is uterine septum, followed by bicornuate uterus and didelphic uterus (8). Transvaginal ultrasound is a very valuable imaging technique for detecting abnormalities of the uterus, especially in early pregnancy. Magnetic resonance imaging (MRI) and hysterosalpingography (HSG) can also be used for diagnosis. In addition, laparoscopy and laparotomy may be preferred as they offer both diagnostic and therapeutic advantages. Early diagnosis of uterine abnormalities is important for clinical follow-up. The incidence of recurrent pregnancy loss, preterm labor, spontaneous abortion and premature rupture of membranes is increasing (9). In unmonitored pregnancies, diagnosis is delayed and the diagnosis can be made at the time of delivery. To prevent obstetric complications, it is important to perform a detailed ultrasound scan and pelvic examination before pregnancy and to perform any necessary surgical interventions if they can be detected and corrected early.

Stagnation or maldevelopment at any stage of embryonic development leads to heterogeneous and complex anomalies of the congenital genital tract. Congenital anomalies leading to obstruction of menstrual flow include, in particular, an imperfore hymen, a transverse vaginal septum, partial agenesis of the vagina and agenesis of the cervix (10). An obstructive anomaly is manifested by primary amenorrhea and cyclic pain due to the formation of hematocolpos and hematometra.

Uterine abnormalities are often found in women with a history of reproductive problems. While 2D ultrasound and HSG are suitable for screening for uterine abnormalities, 3D ultrasound, MRI and combined laparoscopy and hysteroscopy can correctly classify the type of uterine abnormality as they can show both the external and internal contours of the uterus (11,12). While 3D ultrasound is now considered the gold standard in the diagnosis of uterine anomalies due to its high diagnostic accuracy, less invasive nature and comparatively low cost, MRI is reserved for the diagnosis of complex Mullerian anomalies or when a diagnostic dilemma arises. Laparoscopy and hysteroscopy are invasive procedures for diagnostic purposes

and should only be offered in conjunction with concomitant surgical treatment after a thorough non-invasive evaluation of a Mullerian anomaly (11). If a uterine abnormality is diagnosed, imaging for renal abnormalities is recommended (13).

The incidence of congenital uterine anomalies appears to be higher than previously thought thanks to improved diagnostic imaging techniques (12). Studies conducted with regard to reproductive outcomes show that the number of first and second trimester abortions is significantly higher in women with congenital uterine anomalies compared to the general/fertile population. Acquired uterine malformations (submucosal fibroids, endometrial polyps and uterine adhesions) are common in women with pregnancy loss, but their clinical significance is uncertain. Hysteroscopic metroplasty is the preferred treatment option for uterine septum. Hysteroscopic septal resection has been shown to reduce the rate of pregnancy loss, but there is insufficient evidence to support this. While the ASRM recommends septal resection, the ESHRE advises against septal resection due to insufficient evidence.

Thus, in contrast to previous studies, the rate of anomalies occurring at birth is much lower. However, it is important to note that these incidental uterine anomalies have the least association with pregnancy complications or fertilization success. Nevertheless, these and similar studies are important to know the true incidence of uterine anomalies in the population. In any case, multicenter studies with more participants would be appropriate.

Author contribution

Study conception and design: ZCA, ÖYÇ and RSK; data collection: ZCA; analysis and interpretation of results: ÖYÇ and RSK; draft manuscript preparation: ZCA, ÖYÇ and RSK. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Ethics Committee for Noninterventional Studies of University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital (Protocol no. 11/11 23.11.2023).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Araştırma fikri ve tasarımı: ZCA, ÖYÇ ve RSK; veri toplama: ZCA; sonuçların analizi ve yorumlanması: ÖYÇ ve RSK; araştırma metnini hazırlama: ZCA, ÖYÇ ve RSK. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için Etlik Zubeyde Hanım Kadın Sağlığı Eğitim ve Araştırma Hastanesi Girişimsel Olmayan Çalışmalar Etik Kurulundan onay alınmıştır (Karar no: 11/11 23.11.2023).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

References

1. Kachhawa G, Kriplani A. Management of Reproductive Tract Anomalies. J Obstet Gynaecol India. 2017;67(3):162-7. [Crossref]
2. Chulani VL, Gordon LP. Adolescent growth and development. Prim Care. 2014;41(3):465-87. [Crossref]
3. Aplin JD, Myers JE, Timms K, Westwood M. Tracking placental development in health and disease. Nat Rev Endocrinol. 2020;16(9):479-94. [Crossref]
4. Dietrich JE, Millar DM, Quint EH. Non-obstructive müllerian anomalies. J Pediatr Adolesc Gynecol. 2014;27(6):386-95. [Crossref]
5. Pfeifer SM, Attaran M, Goldstein J, et al. ASRM müllerian anomalies classification 2021. Fertil Steril. 2021;116(5):1238-52. [Crossref]
6. Grimbizis GF, Di Spiezio Sardo A, Saravelos SH, et al. The Thessaloniki ESHRE/ESGE consensus on diagnosis of female genital anomalies. Hum Reprod. 2016;31(1):2-7. [Crossref]
7. Cunha GR, Robboy SJ, Kurita T, et al. Development of the human female reproductive tract. Differentiation. 2018;103:46-65. [Crossref]
8. Bhagavath B, Ellie G, Griffiths KM, et al. Uterine Malformations: An Update of Diagnosis, Management, and Outcomes. Obstet Gynecol Surv. 2017;72(6):377-92. [Crossref]
9. Hosny AEMS, Fakhry MN, El-Khayat W, Kashef MT. Risk factors associated with preterm labor, with special emphasis on preterm premature rupture of membranes and severe preterm labor. J Chin Med Assoc. 2020;83(3):280-7. [Crossref]
10. Mentessidou A, Mirilas P. Surgical disorders in pediatric and adolescent gynecology: Vaginal and uterine anomalies. Int J Gynaecol Obstet. 2023;160(3):762-70. [Crossref]
11. Jayaprakasan K, Ojha K. Diagnosis of Congenital Uterine Abnormalities: Practical Considerations. J Clin Med. 2022;11(5):1251. [Crossref]
12. Mørk N, Lauszus FF, Agha Krogh RH. Congenital uterine anomalies and their association with fertility and pregnancy outcomes. Ugeskr Laeger. 2018;180(40):V02180149.
13. Oppelt P, von Have M, Paulsen M, et al. Female genital malformations and their associated abnormalities. Fertil Steril. 2007;87(2):335-42. [Crossref]

Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Yurtseven K, Akbaba AK, Akdaş Reis Y. Anne sütü arttırmada galaktogog kullanımının etkinliği. T Kadın S Neonatol Dergisi 2024; 6(1): 20-26.

Orijinal Makale

Anne Sütü Arttırmada Galaktogog Kullanımının Etkinliği

The Efficacy of Taking Galactogogues to Increase Breast Milk

Kübra Yurtseven *[1], Asena Kübra Akbaba [1], Yıldız Akdaş Reis [1]

[1] Ankara Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim ve Araştırma Hastanesi, Ankara, Türkiye

Öz

Amaç: Annelerin çoğu doğumdan sonra bebeklerini emzirmeyi tercih etmektedir. Son veriler, yeni annelerin en az %75'inin bebeklerini emzirmeye çalıştığını göstermektedir. Emziren annelerde süt üretimini artırmak için kullanılan önemli sayıda galaktojenik takviye bulunmaktadır. Çeşitli galaktojenik takviyelerden elde edilen alkollü/sulu ekstraktların, biyolojik düzeyde çeşitli fizyolojik değişiklikler yoluyla süt üretimini koruduğu veya artırdığı bildirilmiştir. Bu çalışmanın amacı, üç günlük galaktojen alımının annelerde süt üretimi üzerindeki etkisini araştırmaktır.

Gereç ve Yöntem: Çalışma, Ocak 2021'de doğum servisinde süt hacmi ve anne sütü ikamesi kullanımı rutin olarak kaydedilen annelerden elde edilen verileri retrospektif olarak analiz etti. Ankara Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim ve Araştırma Hastanesi'nde doğum yapmış, bebeği yenidoğan yoğun bakım ünitesinde yatan ve anne sütünü sağmak için düzenli olarak anne sütü ünitesine gelen annelerin verileri hastanenin kayıt sisteminden alındı. Galaktojen alan ve almayan anneler iki gruba ayrılmıştır. Sağılan süt miktarı başlangıçta ve memenin tamamen boşalmasından 3 saat sonra ve 4. gün belirlendi.

Bulgular: Dördüncü günün sonunda, galaktojen alan ve almayan annelerin ortalama süt hacimleri arasında istatistiksel olarak anlamlı bir fark olmadığı bulunmuştur. Her iki grupta da çalışmanın başında sağılan anne sütü miktarı 4. günde istatistiksel olarak anlamlı şekilde artmıştır.

Sonuç: Literatürde kullanılan bazı galaktojenlerin anne sütü miktarını artırdığını bildiren çalışmalar bulunmaktadır. Galaktojenlerin kullanımına yönelik öneriler sunmak ve güvenli kullanım hakkında detaylı bilgi sağlamak için daha kapsamlı çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Anne sütü; emzirme; galaktogog

Sorumlu Yazar *: Ankara Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim ve Araştırma Hastanesi, Ankara, Türkiye.
E-posta: dytkubrayurtseven@gmail.com
ORCID: 0000-0003-2560-3847
DOI: 10.46969/EZH.1438677
Geliş tarihi: 16.02.2024 Kabul tarihi: 11.03.2024

Abstract

Objective: Most mothers prefer to breastfeed their babies after birth. Recent data show that at least 75% of new mothers try to breastfeed their babies. There are a considerable number of galactogenic supplements that are used to increase milk production in breastfeeding mothers. Alcoholic/aqueous extracts from various galactogenic supplements have been reported to maintain or increase milk production through various physiological changes at the biological level. The aim of the study was to investigate the effect of a three-day intake of galactogens on milk production in mothers.

Material and Method: The study retrospectively analyzed data from mothers whose milk volume and use of breast milk substitutes were routinely recorded in the maternity ward in January 2021. The data of mothers who had given birth at University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital, whose babies were hospitalized in the neonatal intensive care unit and who regularly visited the breast milk unit to express breast milk were taken from the hospital's registration system. The mothers taking galactogens and those not taking galactogens were divided into two groups. The amount of milk expressed was determined at baseline and 3 hours after and at day 4 complete breast emptying.

Results: It was found that at the end of day 4, there was no statistically significant difference between the average milk volumes of mothers with and without galactogens. In both groups, the amount of breast milk expressed at the beginning of the study increased statistically significantly on day 4.

Conclusion: There are studies that report that some galactogens used in the literature increase the amount of breast milk. There is a need for more comprehensive studies to provide recommendations for the use of galactogens and to provide detailed information on safe use.

Keywords: Breast milk; breastfeeding; galactogogue

1. Giriş

Anne sütü besin değeri ve immünolojik içeriği bakımından yeni doğanın büyüme ve gelişmesi için en uygun ve en önemli besin kaynağıdır. Doğumdan itibaren bebeğin en kısa sürede anneyle buluşturulması, anne sütüyle beslenmeye başlaması ve emzirmenin sürdürülmesi çok önemlidir. Dünya Sağlık Örgütü (DSÖ) ve Birleşmiş Milletler Çocuklara Yardım Fonu (UNICEF) bebeklerin ilk altı ay yalnızca anne sütüyle beslenmesini ve en az iki yaşına kadar emzirmenin devam ettirilmesini önermektedir. DSÖ 2025 yılına kadar tüm dünyada emzirmenin iyileştirilmesini desteklemektedir. Buna karşın dünya genelinde bebeklerin yalnızca %38'i ilk altı ay boyunca sadece anne sütü ile beslenmektedir (1,2). DSÖ İş birliği Grubu, "anne sütü ile beslenmemeye" bağlı ölümlerle ilgili dönüm noktası niteliğindeki çalışmasında, anne sütü ile beslenmeyen bebeklerde yaşamın ilk birkaç yılında bebek ölümlerinde önemli bir artış olduğunu tespit etmiştir (3). Anne sütü ile beslenmenin teşvik edilmesi, bebek ölümleri yükünü azaltmak için kullanılan başlıca stratejilerden biri haline gelmiştir ve modern sağlık hizmeti verilen ortamlarda bile enfeksiyon kontrolünde en önemli unsur olmaya devam etmektedir. Çin Halk Cumhuriyeti'nin Chengdu kentinde 845 bebek üzerinde yapılan bir çalışma, en az 3 ay boyunca anne sütüyle beslenen 6 aylıktan küçük bebeklerde alt solunum yolu enfeksiyonu prevalansında önemli bir azalma olduğunu göstermiştir (4). Çalışmalar ayrıca yenidoğan yoğun bakım ünitelerinde (YYBÜ) tedavi edilen düşük doğum ağırlıklı bebeklerde nekrotizan enterokolit insidansını ve mortalitesini azaltmada anne sütü kullanımının faydasını göstermiştir. Emzirmenin morbiditeyi azaltmadaki kısa vadeli faydaları konusunda yüksek düzeyde bir fikir birliği vardır ve DSÖ ile Genel Cerrah Raporları (Surgeon General's Reports) buna iyi birer örnektir (5,6). Yakın zamanda gastrit, mide karsinomu, diş çürükleri ve kronik inflamasyon kaynağı rolü nedeniyle Helicobacter pylori enfeksiyonunun emzirme ile önlenmesi konusu incelenmiştir. Enfeksiyon sıklıkla erken çocukluk döneminde edinilmektedir (7). Bir meta-analizin sonuçları önceki çalışmaları doğrulamakta ve özellikle ekonomik olarak daha az gelişmiş ülkelerde emzirmenin koruyucu etkisini göstermektedir (8). Türkiye Nüfus Sağlık Araştırması (TNSA) 2018 raporunda; ülkemizde bebeklerin %97'sinin belirli sürelerle emzirildiği, ilk 6 aya kadar tek başına anne sütü ile besleme oranın %41 olduğu, sadece anne sütü ile beslenen bebeklerin ortanca emzirilme süresinin 16.7 ay olduğu bildirilmiştir (9).

Süt salınımını başlatmak ve emzirmeyi sürdürmek yeni doğum yapmış anneler için zorlu ve bilinmeyen bir süreçtir. Bu süreçte annenin emzirme konusunda desteklemesi oldukça önemlidir. Emzirme döneminde annenin prolaktin salgısını ve anne sütü üretimini artırmak için farmakolojik ve nonfarmakolojik birçok uygulama kullanılmaktadır. Farmakolojik olmayan yöntemlerden bazıları; sık emzirme, sağma, sıcak uygulama, masaj, galaktogog kullanımıdır. Bu uygulamalar temelde annenin stres seviyesini azaltarak emzirmeye destek olmaktadır.

Dünya genelinde kadınlar süt üretimlerini artırmak için özel diyetlerin uygulanması, bitkisel veya doğal maddelerin kullanılması gibi birçok alternatif yöntem denemektedirler. Farklı kültürel ve etnik kökenlerdeki kadınlar genellikle geleneklerine göre farklı yaklaşımlar seçmektedirler (10,11). Galaktogog olarak bilinen bazı bitkiler arasında; çemen otu, keçisedefi otu, boğa dikeni (Silybum marianum), yulaf, karahindiba, darı, deniz yosunu, anason, fesleğen, peygamber dikeni, rezene tohumu, hatmi, banağacı yaprağı ve ahududu yer alır (12-14). Bazı kültürlerde bira süt artışı için kullanılmaktadır. İçindeki şerbetçiotunun (Humulus Lupulus) artışı sağlayan aktif bileşen olduğu bildirilmektedir (13,14). Bu bitkilerin birçoğu, özellikle de çemen otu, tüm dünyada galaktogog olarak popülerlik kazanmıştır. Çemen otu, yetersiz süt tedariki için en sık tavsiye edilen bitkisel takviyedir ve Hale tarafından L3 (orta derecede güvenli) olarak listelenmiştir (15). Fakat Çemen otuna karşı ciddi alerjik reaksiyonlar bildiren çalışmalar da bulunmaktadır (16). Bu bitkilerin anne sütü artırıcı olarak kullanımı yüzyıllardır devam etse de güvenilirlikleri konusunda bilimsel kanıt az ya da hiç bulunmamaktadır (17). Birçoğu aslında sadece plasebo etkisi göstermektedir ve yine birçoğunun etki mekanizmaları, standart dozları, potansiyel alerji ya da ilaç etkileşimleri bilinmemektedir.

Bu bilgiler ışığında bu çalışmada amaç, üç günlük galaktogog alımının annelerde süt üretimi üzerindeki etkisini araştırmaktır.

2. Gereç ve Yöntem

Ankara Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim ve Araştırma Hastanesi'nde doğum yapan, bebeği yenidoğan yoğun bakım ünitesinde yatan ve anne sütü birimine düzenli olarak anne sütü sağmak için gelmekte olup süt miktarları ve anne sütü güçlendirici kullanımları rutin olarak kayıt altına alınan lohusalar retrospektif olarak çalışmaya dahil edilmiştir.

Çalışma kapsamında 2021 yılı Ocak ayında rutin olarak anne sütü biriminde süt miktarları ve anne sütü güçlendirici kullanımları kayıt altına alınan annelerin verileri kullanılacaktır. Benzer gestasyon haftasında doğum yapan ve benzer demografik özelliklerdeki anne sütü güçlendirici kullanımı olmayan anneler kontrol grubu (2. Grup), kullanımı olan anneler ise çalışma grubuna (1. Grup) dahil edilmiştir. Her iki grupta da meme tam olarak boşaltıldıktan 3 saat sonra sağılan anne sütü miktarları rutin olarak kaydedilmiştir. Çalışma grubu ve kontrol grubu için başlangıç ve 4. Gün sağılan anne sütü miktarları veri olarak kullanılmıştır.

Veri toplama araçları ile elde edilen veriler bilgisayar ortamına sayısal ifade olarak girilmiş ve bu veriler Windows ortamında online SPSS istatiksel analiz programı kullanılarak istatistiksel analizleri yapılacaktır.

Tanımlayıcı istatistikler bölümünde araştırmada yapılacak ölçümlere ait (nicel değişkenler) ortalama, standart sapma, ortanca, en büyük ve en küçük değerler gibi merkezi yığılım ölçüleri kullanılacaktır. Kategorik değişkenler için ise frekans ve yüzde değerleri kullanılacaktır. Uygulanan veri analizinde %95 güvenilirlik düzeyi temel alınacaktır. Niceliksel verilerin karşılaştırılmasında; veriler istatiksel analiz var sayımlarını sağlar ise Ön Test ve Son Test toplam puanlar arasında istatiksel olarak farklılık olup olmadığı parametrik ilişkili örneklemler t testi analizi ile varsayımların sağlanmaması durumunda ise non-parametrik wilcoxon testi ile incelenecektir. Bağımsız grupların ölçümleri arasındaki farklar; veriler istatiksel analiz var sayımlarını sağlar ise tek yönlü varyans analizi (ANOVA), var sayımlar sağlanmaz ise Kuruskal Wallis Analizi kullanılacaktır.

3. Bulgular

Çalışmamıza dahil edilen 20 hasta bulunmaktadır. Bu hastaların 10 tanesi galaktogog kullanımına sahiptir. 10 hasta ise galaktogog kullanmayan kontrol grubuna dahil edilmiştir. Buna göre hastaların demografik özellikleri Tablo 1'de verilmiştir. Buna göre yaş ortalaması 29,3± 3,6 yıl ve vücut kitle indeksi (VKİ) ortalaması 28,4± 3,6 kg/m2'dir.

Tablo 2'de başlangıç anne sütü ile 4. gün sonu anne sütü ölçümlerinden elde edilen ölçüm ortalamaları, standart sapma ve diğer merkezi yığılma ölçüleri incelenmiştir. Tablo 2'ye göre, 1. grupta yer alan katılımcılara ait başlangıç anne sütü ölçümünden elde edilen ortalama 24,1±18,6 ml olarak hesaplanmıştır. 1. grupta yer alan katılımcılara ait 4. gün sonu anne sütü ölçümünden elde edilen ortalama 36,9±22,0 ml olarak hesaplanmıştır. 2. grupta yer alan katılımcılara ait başlangıç anne sütü ölçümünden elde edilen ortalama 25,4±18,4 ml

Tablo 1. Çalışmadaki hastaların demografik verileri

Demografik veriler	Çalışma grubu N (20)
Yaş	29.3 ± 3.6
Parite	
0	9 (45.0%)
1-3	10 (50.0%)
> 3	1 (5.0%)
Vücut Kitle İndeksi (VKİ)	28.4 ± 3.6
Sigara içme (n (%))	8 (40.0%)
Yardımcı Üreme Tekniği ile gebelik (n (%))	3 (15.1%)
Doğum Haftası	37.7 ± 4.1
Sezaryen ile doğum	9 (45.0%)

Tablo 2. Anne sütü ölçümlerinden elde edilen verilerin incelenmesi							
Grup		Ort	Ss	Medyan	Min	Max	Ranj
1	Başlangıç anne sütü (ml)	24,1	18,6	22,5	4	50	46
	4. gün sonu anne sütü (ml)	36,9	22,0	31	15	75	60
2	Başlangıç anne sütü (ml)	25,4	18,4	23,5	2	65	63
	4. gün sonu anne sütü (ml)	39,7	15,8	38,5	15	75	60

Tablo 3. Normal Dağılım Tablosu							
Grup	Ölçüm	Statistic	df	p	Statistic	df	p
1	Başlangıç anne sütü (ml)	0,221	10	0,180	0,862	10	0,081
	4. gün sonu anne sütü (ml)	0,174	10	0,200	0,885	10	0,148
2	Başlangıç anne sütü (ml)	0,114	10	0,200	0,937	10	0,518
	4. gün sonu anne sütü (ml)	0,192	10	0,200	0,918	10	0,339

Tablo 4. Başlangıç anne sütü ile 4. gün sonu anne sütü ölçümleri, katılımcıların grup değişkenine göre incelenmesi							
Ölçüm	Gruplar	N	Ort	Ss	sd	t	p
Başlangıç anne sütü (ml)	1	10	24,1	18,6	18	-	0,877
	2	10	25,4	18,4		0,157	
4. gün sonu anne sütü (ml)	1	10	36,9	22,0	18	-	0,748
	2	10	39,7	15,8		0,327	

olarak hesaplanmıştır. 2. grupta yer alan katılımcılara ait 4. gün sonu anne sütü ölçümünden elde edilen ortalama 39,7±15,8 ml olarak hesaplanmıştır.

İstatiksel karşılaştırmalara geçmeden ilk olarak başlangıç anne sütü ile 4. gün sonu anne sütü ölçümlerinden elde edilen ölçümlerin normal dağılım sergileyip sergilemedikleri kontrol edilmiştir. Elde edilen bulgular Tablo 3'te verilmiştir. Anne sütünden elde edilen ölçümler normal dağılım özelliği sergilemektedir (p>0,05).

Başlangıç anne sütü ile 4. gün sonu anne sütü ölçümleri, katılımcıların grup değişkenine göre istatiksel olarak farklılık gösterip göstermediği ilişkisiz örneklemler için t testi ile incelenmiştir. Elde edilen bulgular Tablo 4'te verilmiştir. Grup faktörünün, katılımcıların başlangıç anne sütü üzerine anlamlı bir etkisinin olup olmadığını ortaya koymak için ilişkisiz örneklemler için t testi gerçekleştirilmiştir. 1. grupta yer alan katılımcıların başlangıç anne sütü ölçüm ortalamaları ($\bar{x}$=24,1 ml) ile 2. grupta yer alan katılımcıların başlangıç anne sütü ölçüm ortalamaları ($\bar{x}$=25,4 ml) arasında istatiksel olarak anlamlı bir fark bulunamamıştır (t=-0,157 ve p>0,05). Grup faktörünün, katılımcıların 4. gün sonu anne sütü üzerine anlamlı bir etkisinin olup olmadığını ortaya koymak için ilişkisiz örneklemler için t testi gerçekleştirilmiştir. 1. grupta yer alan katılımcıların 4. gün sonu anne sütü ölçüm ortalamaları ($\bar{x}$=36,9 ml) ile 2. grupta yer alan katılımcıların 4. gün sonu anne sütü ölçüm ortalamaları ($\bar{x}$=39,7 ml) arasında istatiksel olarak anlamlı bir fark bulunamamıştır (t=-0,327 ve p>0,05).

1. grupta ve 2. grupta yer alan katılımcıların başlangıç anne sütü ile 4. gün sonu anne sütü ölçümleri arasında istatiksel olarak farklılık olup olmadığı ilişkili örneklemler t testi analizi ile incelenmiştir. Elde edilen bulgular Tablo 5'te verilmiştir. 1. grupta yer alan katılımcıların başlangıç anne sütü ile 4. gün sonu anne sütü ölçümleri arasında istatiksel olarak anlamlı bir fark olup olmadığını ortaya koymak için ilişkili örneklemler için t testi gerçekleştirilmiştir. 1. grupta yer alan katılımcıların 4. gün sonu anne sütü ölçüm ortalamaları (X=36,9), 1. grupta yer alan katılımcıların başlangıç anne sütü ortalamalarından (X=24,1) istatiksel olarak anlamlı derecede yüksektir (t=-6,589 ve p<0,05). 2. grupta yer alan katılımcıların başlangıç anne sütü ile 4. gün

Tablo 5. 1. grupta ve 2. grupta yer alan katılımcıların başlangıç anne sütü ile 4. gün sonu anne sütü ölçümleri arasındaki farkın incelenmesi

Grup	Ölçek	N	Ort	S sap.	sd	t	p
1. Grup	Başlangıç anne sütü (ml)	10	24,1	18,58	9	-6,589	0,000
	4. gün sonu anne sütü (ml)	10	36,9	21,98			
2. Grup	Başlangıç anne sütü (ml)	10	25,4	18,37	9	-5,575	0,000
	4. gün sonu anne sütü (ml)	10	39,7	15,84			

sonu anne sütü ölçümleri arasında istatiksel olarak anlamlı bir fark olup olmadığını ortaya koymak için ilişkili örneklemler için t testi gerçekleştirilmiştir. 2. grupta yer alan katılımcıların 4. gün sonu anne sütü ölçüm ortalamaları (X=39,7), 2. grupta yer alan katılımcıların başlangıç anne sütü ortalamalarından (X=25,4) istatiksel olarak anlamlı derecede yüksektir (t=-5, 575 ve p<0,05).

4. Tartışma

Bu çalışmada temel amaç; galaktogog kullanımının katılımcıların 4. gün sonu anne sütü üzerine anlamlı bir etkisinin olup olmadığını ortaya koymaktır. 1. grupta yer alan (galaktogog kullanımı bildiren) katılımcıların 4. gün sonu anne sütü ölçüm ortalamaları ile 2. grupta yer alan (galaktogog kullanımı olmayan) katılımcıların 4. gün sonu anne sütü ölçüm ortalamaları arasında istatiksel olarak anlamlı bir fark bulunamamıştır (t=-0,327 ve p>0,05).

Literatür incelendiğinde bu konuda yapılmış çeşitli çalışmalar olduğu görülmektedir. Bunlardan bir tanesi "*Shatavari racemosus*", halk arasında bilinen adıyla "kuşkonmaz" bitkisiyle yakın zamanda yapılmış çalışmadır. Shatavari, geleneksel Hint kültüründe yaygın olarak anne sütü miktarını artırmada kullanılan bir bitkidir. Doğum sonrası kadınlarda oral Shatavari formülasyonunun (Shavari Bar®) anne sütü çıkışı üzerindeki etkisini değerlendirmek amacıyla yapılan bu çalışmada; gebelik haftası 37 hafta veya daha fazla olan, emzirmeyi planlayan kadınlarla iki merkezde prospektif, randomize, paralel gruplu, çift kör, plasebo kontrollü bir araştırma yürütülmüştür. Çalışmaya toplam 78 kadın dahil edilmiştir. Katılımcılar Shatavari ve yulaf içeren bar (n=39, deney) veya plasebo barı (n=39, kontrol) almak üzere randomize edilmiştir. 78 kadının tamamı çalışmayı tamamlamış; bunlardan 61'i sezaryen (LSCS) ile doğum yapmış ve 17'si vajinal doğum yapmıştır. Süt hacmi ölçümleri, standart bir sağım pompası kullanılarak doğumdan 72 saat sonra veya dört adet bar tüketildikten sonra yapılmıştır. İki grubun sonuçları t-testi kullanılarak analiz edilmiştir. Her iki gruptaki katılımcıların demografik verileri benzerdir. Ölçülen ortalama toplam süt hacmi, oral Shavari (64,74 ml) kullanımı olan grupta plaseboya (49,69 ml) kıyasla daha yüksektir (p=0,008). Meme dolgunluğuna kadar geçen süre, Shavari (30,49 saat) grubunda plaseboya (38.09 saat) kıyasla daha kısadır (p=0.024). Her iki çalışma grubunda da herhangi bir olumsuz olay kaydedilmemiştir. Çalışmanın sonucunda; doğum sonrası kadınlarda erken emzirmeyi sağlamak ve emzirme konusunda güven oluşturmak için oral Shatavari formülasyonunun farmakolojik olmayan bir müdahale biçimi olarak kullanılabileceği bildirilmiştir (18). Çalışma, sonuçları bakımından yapmış olduğumuz çalışmaya kıyasla farklı veriler sunmaktadır.

Mısır'da yapılan başka bir çalışmada ise; çemen otu tüketiminin sağılan anne sütü hacmi ve doğum sonrası prolaktin düzeyi değişimi üzerindeki etkisi değerlendirilmiştir. Çalışmaya, bebeği Ain Shams Üniversitesi Pediatrik YYBÜ'ye iki haftadan uzun süre yatırılan ve manuel sağım pompası kullanarak anne sütünü sağan 60 sağlıklı anne dahil edilmiştir. Anneler iki ayrı gruba ayrılmıştır. Deney grubu; günde üç kez 200 ml çemen otu çayı (50 g çemen otu tohumu) tüketip günde sekiz kez manuel pompayla sağım yapan 30 anneden, kontrol grubu ise yine günde 8 kez sağım yapan fakat çemen otu tüketimi olmayan 30 anneden oluşturulmuştur. Sağılan anne sütünün toplam günlük hacmi 4. gün, 8. gün ve 15. günde değerlendirilmiş, serum prolaktin seviyeleri ise 4. gün ve 15. günde sabah saat 9'da örnek alınarak bakılmıştır. Elde edilen bulgular şu şekildedir; çemen otu grubunda ortalama anne sütü hacminin kontrol grubuna göre daha erken (4. günde) arttığı görülmüştür (sırasıyla 274.60 ± 46.97 ml, 246.37 ± 46.62 ml p <0.005). Ancak 8. ve 15. günlerde net günlük hacim her iki grup arasında anlamlı bir fark göstermemiştir. Prolaktin düzeyi çemen otu grubunda 4. günde diğer gruba göre anlamlı derecede yüksektir (152.77 ± 18.46 ng/ml'ye karşı 134.53 ± 17.35 ng/ml) ve daha sonra anlamlı bir fark oluşmamıştır. Çemen otu tüketiminin laktogenezi ve prolaktin düzeyini erken dönemde etkilediği, ancak yerleşik anne sütü hacmini veya daha sonraki aşamalarda prolaktin düzeyindeki değişimi etkilemediği görülmüştür (19). Çalışma, erken dönem dışında temelde anne sütü miktarında artış görülmemesi bakımından yapmış olduğumuz çalışma ile benzer sonuçlar sunmuştur.

Yüzlerce yıldır Endonezya halkı tarafından anne sütü uyarıcısı olarak kullanıldığı bilinen *Coleus amboinicus* (CA) bitkisinin incelendiği bir başka çalışmada; laktasyonun ilk ayında geleneksel CA kullanımının anne sütünün miktar ve kalitesine etkisi araştırılmıştır. Elde edilen sonuçlar CA takviyesinin anne sütünün besin kalitesinden ödün vermeden anne sütü üretimini arttırdığını göstermektedir. CA takviyesi alan emziren kadınların, takviyenin son iki haftasında (14. günden 28. güne kadar) süt hacminde %65'lik bir artış görülmüştür. Bu artış, Moloco+B12 tabletleri (%10) veya Çemen otu tohumu (%20) alan emziren kadınlardaki artıştan daha fazladır. CA takviyesi alımının etkilerinin kullanım sona erdikten bir ay sonra bile devam ettiği bildirilmiştir. Mevcut çalışmanın sonuçları, CA kullanımının genel olarak emziren kadınlar için uygun olabileceği yönündeki inanç ve uygulamayı doğrulamıştır (20).

Anneler için bebeği beslemenin en doğal ve en sağlıklı yolu emzirmedir (21). Özellikle YYBÜ'de bir bebeği "emzirmek", bebek fizyolojik olarak memeyi emebilecek olgunluğa ulaşana kadar annenin haftalarca, aylarca süt için manuel olarak sağım yapması gerektiği anlamına gelir. Bu sebeple bebeği YYBÜ'deki anneler, anne sütü güçlendirici olarak işlev gören tamamlayıcı ve alternatif yöntemlere yönelmektedir. Anne sütü miktarını artırmaya yönelik bu yöntemler arasında bitkisel galaktogoglar yaygın olarak kullanılmaktadır (22). Öte yandan hali hazırda piyasada anne sütünü arttırıcı etkisi olduğu iddia edilen birçok farmasötik, bitki ve gıda kaynaklı damla/çay vb maddenin satışı bulunmaktadır. Dahası emziren anneler sosyal medya, forum ve paylaşım siteleri yoluyla bu ürünlerin süt arttırıcı etkilerinin olup olmadığı konusunda birbirleriyle bireysel deneyimlerine dayalı bir bilgi paylaşımı içerisindedir. Bu noktada popüler paylaşımların bilimsel dayanağı olup olmadığı mutlaka araştırılmalıdır. Bilimsel temeli olmayan birtakım bilgilerin internet aracılığıyla paylaşılması ve reklamlarının yapılması anne ve bebek sağlığını riske atmaktadır. Diğer yandan etik kaygılar, emziren kadınlarda deneysel çalışmaların yürütülmesini kısıtladığından elde edilen veriler genellikle hayvan modelleri ile sınırlı kalmıştır. Hayvan deneylerinde etkisi kanıtlanan birçok bitkisel galaktogog için emziren annelerde güvenli kullanıma yönelik güçlü tavsiyelerde bulunmak doğru değildir. Sıçanlarda etkisi ortaya konulmuş bitkisel galaktogogların insan modelli çalışmalar ile etkilerinin doğrulanmasına ihtiyaç vardır (23).

Çalışmamızda galaktogog kullanımı olan ve olmayan annelerin 3 günde sağdıkları anne sütü miktarları değerlendirilmiştir. Her iki grupta da 1. gün ve 4. gün sağılan anne sütü miktarları değerlendirildiğinde istatistiksel olarak anlamlı düzeyde artış görülmektedir. Bu artışın doğum sonrası sürece bağlı doğal bir artış olduğu düşünülmektedir. Galaktogog kullanımı olan ve olmayan grupta anne sütü artışı açısından istatiksel olarak anlamlı bir fark bulunamamıştır.

Anne sütünü artırma amacı ile geleneksel olarak kullanılan galaktogog desteklerin coğrafi açıdan farklılık gösterebileceği unutulmamalıdır (24). Uygun galaktogog seçiminde hem anne hem de bebek açısından potansiyel fayda ve risklerin değerlendirilmesi çok önemlidir. Galaktogoglar için dozaj, tedavi süresi, anne ve bebek için olası yan etkilerle ile endikasyonlar incelenmeli öneriler bu doğrultuda yapılmalıdır (25). Sütünün yetersiz olduğunu düşünen annelere normal emzirme sıklıklarının, emme zamanlarının ve miktarlarının çok değişken olduğu anlatılmalıdır. Eğer objektif bir değerlendirme yetersiz süt üretimini doğrularsa, annelere optimal süt sağma/emzirme sıklığı anlatılmalı ve memenin tam olarak boşaltılması konusunda eğitim verilmelidir (26). Ayrıca annenin yeterli ve dengeli beslenmesi, sıvı tüketiminin yeterli olması, stresten uzak huzurlu bir ortamda olması çok önemlidir.

Anne sütü artırma konusundaki önerilere rehberlik edebilecek, bitkisel galaktogoglarla ilgili mevcut bilgilerimizi genişletecek ve galaktogogların güvenli kullanımlarına yönelik kanıtlar sunacak daha kapsamlı klinik araştırmaların sayısının arttırılması ve desteklenmesi gerekmektedir.

Yazar katkısı

Araştırma fikri ve tasarımı: KY ve AKA; veri toplama: KY ve AKA; sonuçların analizi ve yorumlanması: KY ve AKA; araştırma metnini hazırlama: KY, AKA ve YAR. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için Etlik Zübeyde Hanım Kadın Hastalıkları Eğitim ve Araştırma Hastanesi Eğitim Planlama Kurulundan onay alınmıştır (Karar no: 02/28.02.2024).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

Author contribution

Study conception and design: KY and AKA; data collection: KY and AKA; analysis and interpretation of results: KY and AKA; draft manuscript preparation: KY, AKA and YAR. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital Educational Planning Board (Protocol no. 02/28.02.2024).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Kaynaklar

1. World Health Organization (WHO). Global Strategy for Infant and Young Child Feeding. Geneva: WHO; 2002.
2. UNICEF. Infant and young child feeding 2021. Available at: https://data.unicef.org/topic/nutrition/infant-and-young-child-feeding/ (Accessed on March 5, 2024).
3. WHO Collaborative Group. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality. Lancet. 2000;355:451-5. [Crossref]
4. Yu C, Binns CW, Lee AH. Comparison of breastfeeding rates and health outcomes for infants receiving care from hospital outpatient clinic and community health centres in China. J Child Health Care. 2016;20(3):286-93. [Crossref]
5. US Department of Health and Human Services. The Surgeon General's Call to Action to Support Breastfeeding. Washington, DC: Department of Health and Human Services, Office of the Surgeon General; 2011.
6. Horta B, Victora C. The Short-Term Effects of Breastfeeding: A Systematic Review. Geneva, Switzerland: World Health Organization; 2013.
7. O'Ryan ML, Lucero Y, Rabello M, et al. Persistent and transient Helicobacter pylori infections in early childhood. Clin Infect Dis. 2015;61(2):211-8. [Crossref]
8. Carreira H, Bastos A, Peleteiro B, Lunet N. Breast-feeding and Helicobacter pylori infection: systematic review and meta-analysis. Public Health Nutr. 2015;18(3):500-20. [Crossref]
9. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. 2018 Türkiye Nüfus ve Sağlık Araştırması. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı ve TÜBİTAK, Ankara; 2019. Available at: https://fs.hacettepe.edu.tr/hips/dosyalar/Ara%C5%9Ft%C4%B1rmalar%20-%20raporlar/2018%20TNSA/TNSA2018_ana_Rapor_compressed.pdf (Accessed on March 5, 2024).
10. Choudhry UK. Traditional practices of women from India: pregnancy, childbirth, and newborn care. J Obstet Gynecol Neonatal Nurs. 1997;26(5):533-9. [Crossref]
11. Dahlen HG, Homer CSE. Infant feeding in the first 12 weeks following birth: a comparison of patterns seen in Asian and non-Asian women in Australia. Women Birth. 2010;23(1):22-8. [Crossref]
12. Mortel M, Mehta SD. Systematic review of the efficacy of herbal galactogogues. J Hum Lact. 2013;29(2):154-62. [Crossref]
13. Haastrup MB, Pottegård A, Damkier P. Alcohol and breastfeeding. Basic Clin Pharmacol Toxicol. 2014;114(2):168-73. [Crossref]
14. Kayıran SM. Galaktogoglar. Klinik Tıp Pediatri Dergisi. 2018;10(6):28-31.
15. Hale TW. Medications and Mothers' Milk 12th ed. Hale Publishing, LP: Amarillo, TX, USA; 2006.
16. Tiran D. The use of fenugreek for breast feeding women. Complement Ther Nurs Midwifery. 2003;9(3):155-6. [Crossref]
17. Anderson PO. Herbal Use During Breastfeeding. Breastfeed Med. 2017;12(9):507-9. [Crossref]
18. Birla A, Satia M, Shah R, Pai A, Srivastava S, Langade D. Postpartum Use of Shavari Bar® Improves Breast Milk Output: A Double-Blind, Prospective, Randomized, Controlled Clinical Study. Cureus. 2022;14(7):e26831. [Crossref]
19. Sevrin T, Boquien CY, Gandon A, et al. Fenugreek Stimulates the Expression of Genes Involved in Milk Synthesis and Milk Flow through Modulation of Insulin/GH/IGF-1 Axis and Oxytocin Secretion. Genes (Basel). 2020;11(10):1208. [Crossref]
20. Damanik R, Wahlqvist ML, Wattanapenpaiboon N. Lactagogue effects of Torbangun, a Bataknese traditional cuisine. Asia Pac J Clin Nutr. 2006;15(2):267-74.
21. Golan Y, Assaraf YG. Genetic and Physiological Factors Affecting Human Milk Production and Composition. Nutrients. 2020;12(5):1500. [Crossref]
22. Jackson PC. Complementary and alternative methods of increasing breast milk supply for lactating mothers of infants in the NICU. Neonatal Netw. 2010;29(4):225-30. [Crossref]
23. Irmak AY,Balkan Z, Metinoğlu M, Herbal Galactogogues to Increase Breast Milk Production: Literature Review. Sağlık ve Toplum. 2019;29(1):13-26.
24. Section on Breastfeeding; Eidelman AI, Schanler RJ, Johnston M, et al. Breastfeeding and the use of human milk. Pediatrics. 2012;129(3):e827-41. [Crossref]
25. Zuppa AA, Sindico P, Orchi C, Carducci C, Cardiello V, Romagnoli C. Safety and efficacy of galactogogues: substances that induce, maintain and increase breast milk production. J Pharm Pharm Sci. 2010;13(2):162-74. [Crossref]
26. Kent JC, Prime DK, Garbin CP. Principles for maintaining or increasing breast milk production. J Obstet Gynecol Neonatal Nurs. 2012;41(1):114-21. [Crossref]

To cite this article: Kansu Çelik H, Güler M. Mirror sendromu: Olgu sunumu ve her iki ebeveynde ABHD5 geninde mutasyon varlığı. T Kadın S Neonatol Dergisi 2024; 6(1): 27-31.

Olgu Sunumu

Mirror Sendromu: Olgu sunumu ve Her İki Ebeveynde ABHD5 Geninde Mutasyon

Mirror Syndrome: Case Report and Presence of Mutation in ABHD5 Gene in Both Parents

Hatice Kansu Çelik *[1], Melike Güler [1]

[1] Lokman Hekim Üniversitesi, Tıp Fakültesi, Kadın Hastalıkları ve Doğum Anabilim Dalı, Ankara, Türkiye

Öz

Mirror sendromu, maternal ödemin ayna görüntüsü olarak yansıyan fetal ve/veya plasental hidrops ile komplike nadir görülen olağan dışı bir gebelik patolojisidir. Fetal hidrops, plasental büyüme ve maternal ödemle karakterize, preeklampsiye benzer semptom ve bulgulara yol açabilen ciddi bir hastalıktır. Maternal ve fetal mortalite ve morbidite riski yaratan ciddi bir hastalıktır. Patogenezi tam olarak anlaşılamamıştır. Bu yazıda bir Mirror sendromu olgusu sunulmakta, ebeveynlerde saptanan genetik mutasyon varlığı ve bu sendromun klinik önemi tartışılmaktadır.

Anahtar Kelimeler: Mirror sendromu; maternal ödem; fetal hidrops; plasental ödem; ABHD5

Abstract

Mirror syndrome is a rare and unusual reproductive pathology complicated by fetal and/or placental hydrops reflected as a mirror image of maternal edema. Fetal hydrops is a serious disease characterized by placental enlargement and maternal edema, which can lead to symptoms and signs similar to preeclampsia. It is a serious disease that poses a risk of maternal and fetal mortality and morbidity. Its pathogenesis is not fully understood. In this article, a case of Mirror syndrome is presented, the presence of a genetic mutation detected in the parents and the clinical significance of this syndrome are discussed.

Keywords: Mirror syndrome; maternal edema; fetal hydrops; placental edema; ABHD5 gene mutation

Sorumlu Yazar *: Lokman Hekim Üniversitesi, Tıp Fakültesi, Kadın Hastalıkları ve Doğum Anabilim Dalı, Ankara, Türkiye.
E-posta: h_kansu@yahoo.com
ORCID: 000-0002-8443-7239
DOI: 10.46969/EZH.1444618
Geliş tarihi: 29.02.2024 Kabul tarihi: 04.03.2024

Volume 6 Number 1 p: 27-31

1. Giriş

Mirror sendromu John William Ballantyne tarafından ilk olarak 1892'de tanımlanmıştır (1). Maternal ödem gelişimi fetustaki patolojinin aynası olarak tariflenmiştir. Sonraki yıllarda bu maternal hidrops sendromu ve üçlü ödem (maternal, fetal ve plasental) gibi birçok isim kullanılmıştır. Mirror sendromu tanımı ilk olarak 1956'da O'Driscoll tarafından kullanılmıştır (1). Mirror sendromu ilk tanımlandığında rhesus immunizasyonuna bağlı maternal ve plasental ödem ile fetal hidropik değişikliklerin, preeklampsi benzeri bulgulara eşlik etmesi şeklinde oluştuğu düşünülmüştür. Ancak sonraki yıllarda ikizden ikize transfüzyon, viral enfeksiyonlar, plasental tümör, metabolik bozukluklar, fetal taşikardi ve fetal tümör gibi masif fetal hidropsa yol açabilen her türlü immünolojik ve non-immünolojik faktörlerin etiyolojiden sorumlu olabileceği saptanmıştır. Vakaların %30'nda fetal hidropsa neden olan etiyoloji saptanamamıştır. Patofizyolojisi net olarak bilinmemektedir.

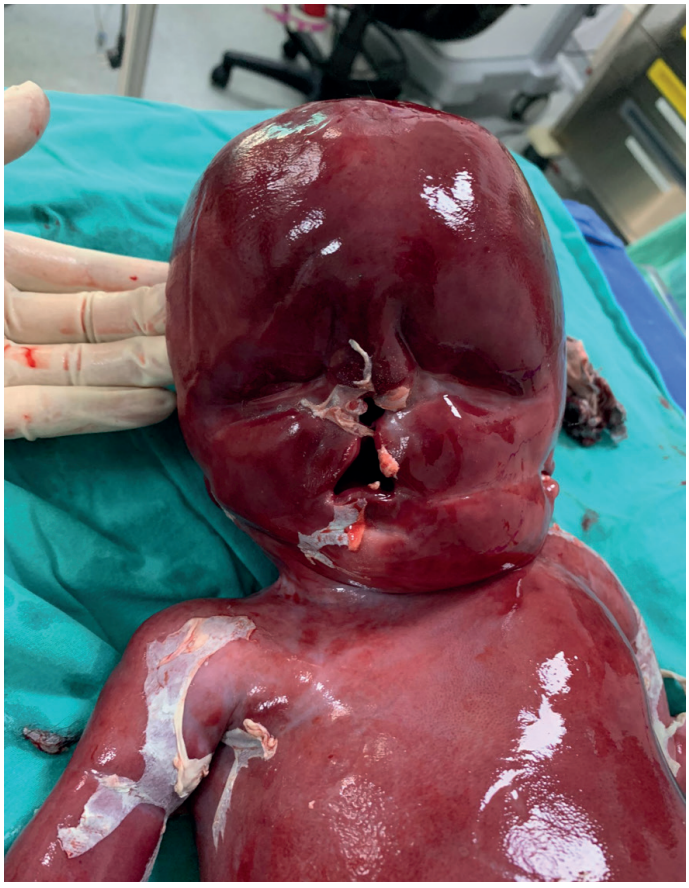
Mirror sendromu son derece nadir görülen ancak yaşamı tehdit edebilen bir gebelik komplikasyonudur. Klinik seyrin ve semptomların preeklampsi ile benzerlik göstermesi tanı koymayı zorlaştırmaktadır. Son derece nadir görüldüğü ve hatalı teşhis edilebildiğinden dolayı insidansı net olarak bilinmemektedir. Akademik literatürde dünya genelinde 100'den az vaka bildirilmiştir (2). Bu olgu sunumunun amacı, nadir görülen ancak yüksek fetal mortalite ile ilişkili bu klinik durumun daha iyi anlaşılmasına katkıda bulunmaktır.

2. Olgu

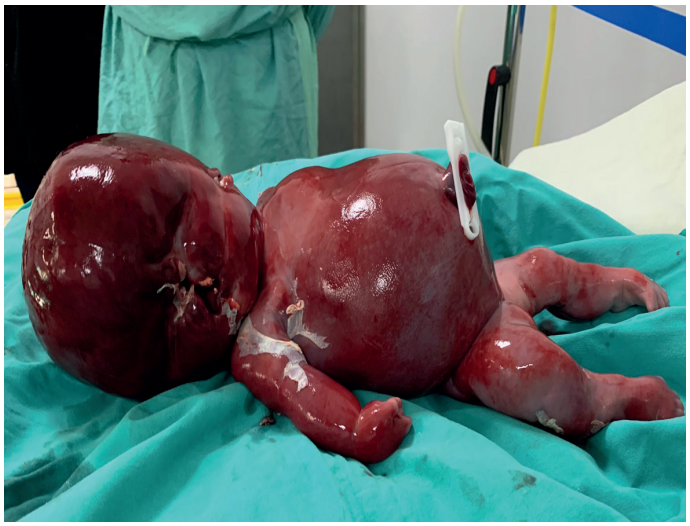
28 yaşında, primigravid 31 hafta gebe, bir haftadır devam eden yaygın bacak ödemi ile kliniğimize başvurdu. Yapılan ultrasonografi incelemesinde, fetal kalp atımı izlenmemiş olup, fetusta ileri derecede yaygın skalp ve cilt ödemi, polihidroamnios saptandı. Hastanın başvuru anında tansiyonu 100/60 MmHg, nabzı 75/dk, Hb: 12,8 g/dL, Hct:36,8 %, trombosit: 259,000/mL karaciğer enzim testleri ve böbrek fonksiyon testleri normal aralıkta, 24 saatlik idrarda protein 3 gr olarak tespit edildi. Hastanın son kontrolünden sonra geçen 20 günlük sürede hızlı kilo artışı olduğu saptandı. Hastanın kan grubu A Rh (+) idi.

Aynı hastanede gebelik takibi yapılan hastanın ilk vizitleri normal olarak saptandı. İlk vizitlerinde yapılan, Toxoplazmozis, Rubella, Sitomegalovirüs (CMV), Hepatit B paneli ve sifiliz testleri negatifdi. Hastanın özgeçmişinde hastalığı bulunmamaktaydı. Soygeçmişinde annesinde ve teyzesinde de benzer gebelik öyküsü bulunduğu öğrenildi. Hastanın sigara kullanmadığı ve akraba evliliği olmadığı bilinmektedir. Hastanın öyküsünde, 3 yıllık infertilite şikayeti olması nedeniyle 1 yıl öncesinde T-shape uterus tanısıyla histeroskopik metroplasti bulunmaktaydı. Gebelik takibi sırasında 12. Gebelik haftasında Nuchal Translucency 5,5 mm olarak ölçülmüş olup, genetik inceleme amaçlı koryon villüs örneklemesi önerildi. Hasta ileri inceleme yaptırmak istemedi. Gebeliğin 15. Haftasında alobar holoprozensefali, sebosefali (hypotelorizm, tek burun deliği), yarık damak ve dudak, tüm ekstremitelerde kısalık, el ve ayaklarda polidaktili ve batında assit olduğu izlendi. Hastaya terminasyon önerildi fakat kabul etmedi. Gebeliğin 27. Haftasında yapılan ultrason incelemesinde tüm vücutta yaygın fetal asit (fetal hidrops fetalis) saptandı. Hastanın gebelik takibi sırasında yapılan kontroller süresince tansiyon değerleri ve laboratuar tetkikleri normal aralıkta izlendi. Soygeçmişinde gebenin annesinde ve teyzesinde de benzer gebelik öyküsü (gebede ödem ve bebekte intrauterin ödemli ölü fetüs) bulunduğu öğrenildi.

31 hafta gebeye intrauterin ex ve makat geliş nedeni ile sezaryen doğum kararı verildi. Hastanın inguinal bölgeye uzanan +4 patolojik ödemi mevcuttu. Sezaryen doğumla, 3360 gram ağırlığında ölü kız bebek doğurtuldu. Sezaryen sırasında batına girişte 500cc serohemorajik sıvı izlendi ve boşaltıldı. Plasenta ödemli görünümde idi. Plasenta patolojiye gönderildi. Fetusta yarık damak-dudak, sebosefali, polidaktili, tüm ekstremitelerde kısalık, hidrops ve hidrosefali tespit edildi (Resim 1, Resim 2).



Resim 1. Fetüsün önden görünüşü



Resim 2. Fetüsün yandan görünüşü

Postoperatif 1.gününde tansiyon 110/70 mm Hg, Hb:9 g/dL, Hct:26,2 %, trombosit:181000 mL, Albumin:1,8 g/dL, karaciğer ve böbrek fonksiyon testleri normaldi. Hastaya 1 adet human albümin, 1 adet furosemid, 2 ünite eritrosit süspansiyonu ve taze donmuş plazma transfüze edildi. Alt ekstremite ödemi +2'ye geriledi. Postoperatif 2.gününde hasta iyi durumda taburcu edildi.

Gebenin soygeçmişinde, annesinde ve teyzesinde de benzer gebelik öyküsü (gebede ödem ve bebekte intrauterin ödemli ölü fetüs) bulunduğu öğrenildi. Her iki ebeveynden karyotip analizi istendi ve normal olarak geldi. Trombofili taramasında Faktör V R2 heterozigot muatsyonu ve MTFHR 677 C>T polimorfizm heterozigot mutasyonu saptandı. Genetik inceleme sonucu her iki eşte de ABHD5 geninde heterozigot değişiklik saptandı ve bu genin ilişkili olduğu fenotip otozomal resesif kalıtım göstermekte olup eşler bu varyant açısından taşıyıcı olarak bulundu. Eşlerin homozigot konumunda bulunan çocuk sahibi olma riskleri %25 olarak saptandı ve aileye sonraki gebelikler için preimplantasyon genetik tanı önerildi. Aile doğumdan sonra ölü fetüse otopsi yapılmasını ve genetik tanı için materyal gönderilmesini kabul etmedi.

3. Tartışma

Mirror sendromu oldukça nadir görülmekle birlikte teşhis edilmesi zor bir klinik tablodur ve birçok farklı nedenle ortaya çıkabilmektedir. Hastalık ciddi oranda artmış fetal mortalite ve maternal morbiditeye yol açmaktadır.

Etiyoloji hala belirsizliğini korumaktadır. Literatürde Aralık 2008'e kadar bildirilen 56 vaka ile yapılan bir derleme, çok çeşitli fetal kaynaklı durumun Mirror sendromu ile ilişkili olabileceğini göstermiştir (2). Derleme sonucunda olguların büyük çoğunluğunun ciddi rhesus immunizasyonuna bağlı olduğu gözlenmiştir. Bununla beraber, ikiz gebelik, viral enfeksiyonlar (Parvovirüs, CMV), plasental tümör, sakrokoksigeal teratom (3), Galen ven anevrizması (4), Ebstein anomalisi (5) ve fetal aritmi gibi non-immünolojik nedenlere bağlı gelişen olgular yayınlanmıştır.

Mirror sendromunun patofizyolojisi hala net olarak bilinmemektedir. Ancak altta yatan nedenin preeklampsiye benzer özellikte bazı moleküler yolaklarda meydana gelen değişikliklere bağlı olduğu düşülmektedir. Bu durum klinik olarak benzer semptomları açıklamaktadır. Yapılan bazı çalışmalarda Mirror sendromunun gelişiminde vasküler endotelyal büyüme faktörü-1, fms benzeri çözünür tirozin kinaz 1, aktivin A, folistatin, endotelin-1 ve plasental büyüme faktörünün rol oynadığına dair bulgular saptanmıştır. Ancak preeklampsi ve Mirror sendromunda düzensizliğe yol açan tetikleyici mekanizmanın farklı nedenlerden kaynaklandığı ve bu nedenle klinik farklılıklar olduğu düşünülmektedir. Mirror sendromunda birincil patofizyolojik bulgu villus ödeminden kaynaklanmaktadır. Patolojik süreç başladığında preeklampsinin aksine endotelyal alan ilk başta sağlam olarak tespit edilmiştir. Villöz ödemin yol açtığı trofoblastik villöz hipoksi sonucunda plasental mediatörlerin akut ve geri dönüşümlü plasental mediatör salınımına yol açtığı saptanmıştır. Mirror sendromunun düzeltildiği zaman hem fetal hem maternal iyileşmeyi sağlayan bir fetal patolojiden kaynaklandığı düşünülmektedir. İntrauterin kan transfüzyonu ile fetal aneminin düzeltildiği konjenital parvovirüs enfeksiyonları, hidropsun sadece bir dikoryonik ikiz eşinde olduğu ve hidropik fetusun spontan kaybını takiben maternal durumun kısa süre içinde düzeldiği olgular iyileştirilebilen Mirror sendromuna iyi birer örnek olarak gösterilmektedir (6).

Mirror sendromunda fetal, plasental ve maternal ödem üçlü triadı patognomonik bulgu olarak saptanmaktadır. Klinik semptomlar sıklıkla preeklampsi ile karışabilmektedir. Preeklampsi başlangıcı 20. gebelik haftasından sonra ortaya çıkmaktadır, Mirror sendromu 16-34. haftalar arasında ortaya çıkabildiği gösterilmiştir (7). Maternal yaygın ödem, maternal ani kilo artışı, hipertansiyon, proteinüri, baş ağrısı, oligüri ve pulmoner ödem semptomları görülmektedir. Laboratuvar bulguları arasında artmış veya normal karaciğer enzimleri, normal veya bozulmuş böbrek fonksiyon testleri, artmış ürik asit seviyesi, düşük hematokrit ve genellikle normal aralıkta trombosit sayımı bulunmaktadır. Preeklampsi ile ayırıcı tanıda en önemli klinik bulgu ise hemodilüsyona bağlı gelişen anemi, hemolizi ekarte eden düşük hematokrit seviyesi ve hipoproteinemidir (4). Preeklampside beklenen

oligohidroamnios ve intrauterin gelişme geriliği yerine, Mirror sendromunda genellikle polihidroamnios ve hidropik iri bir fetüs görülmektedir.

Fetal hidrops gelişen hastalarda %5-29'unda altta yatan nedenin Mirror sendromu olabileceği saptanmıştır (8). Mirror sendromunda fetal prognoz oldukça kötü seyretmektedir. İntrauterin ölüm oranı %56 olarak tahmin edilmektedir (4). Maternal semptomlar doğumu takip eden 4,8 ile 13,5 gün arasında iyileşmektedir (4).

Olgumuz Mirror sendromunun tipik özelliklerini taşımaktadır. Etiyolojide kesin bir sebep belirlenememiştir. Fetusun diğer bulguları göz önüne alındığında altta yatan genetik bir durum olabileceği düşünülmektedir. Fetusun intrauterin kaybı sonucunda maternal stabilizasyonu sağlamak ve morbidite riskini azaltmak için hızlıca doğum kararı verilmiştir. Maternal durum doğum sonrası 1 hafta içerisinde normale dönmüştür.

Mirror sendromu olan gebelerde literatürde genetik inceleme ile ilgili veri buunmamaktadır. Bizim ailemizde her iki ebeveynde de ABDH5 geninde heterozigot mutasyon saptandı. Bu genin homozigot muatsyonu literatürde Chanarin-Dorfman sendromu olarak bilinmektedir. Bu sendrom , konjenital iktiyozis ve çeşitli hücrelerde lipit damlacıklarının birikimi ile ilişkili kalıtsal bir metabolik bozukluktur. ABHD5/ CG158 geninin 3. kromozomun kısa kolundaki mutasyon ana metabolik kusurdan sorumludur. Klinik olarak hastalık yaşayan bireyerde iktiyozis, işitme kaybı, hepatomegali, splenomegali, siroz, katarakt, keratopati, miyopati ve zeka geriliği ile kendini gösterir (9). Aile fetüste genetik tarama yapılmasına izin vermediği için fetüste bu genle ilgili herhangi bir yorum yapılamadı.

Mirror sendromu tanısı konulduktan sonra hasta yönetimi; altta yatan etiyoloji, fetal durum, gebelik yaşı ve maternal hastalığın ciddiyeti göz önüne alınarak yapılmalıdır. Maternal veya fetal bir risk mevcudiyetinde veya altta yatan tedavisi mümkün olmayan bir etiyoloji saptanırsa doğum endikasyonu olarak kabul edilmektedir (10).

Mirror sendromu fetal hidropsla komplike olmuş gebeliklerde nadir ancak oldukça riskli bir klinik durumdur. Sıklıkla preeklampsi ile benzer klinik semptomlar gösterebildiği için ayırıcı tanı yaparken preeklampsiden ayırımını sağlayan hemodilüsyon bulguları açısından dikkatli olunmalıdır. Takip sırasında progresif olarak ilerleyen fetal hidrops veya kötüleşen maternal durum söz konusu ise doğum düşünülmelidir. Yüksek fetal mortalite ve maternal morbitide riskinde dolayı klinisyenler açısından fetal hidropslu hastalarda ayırıcı tanısında Mirror sendromunu akılda tutmak önemlidir. Fetüs ve anne ile ilgili verilerin ve sonuçların daha kapsamlı bildirilmesi ve belki de farklı genlerin incelenmesi Mirror sendromunun daha iyi anlaşılmasına ve yönetilmesine olanak sağlayacaktır. Mirror sendromu tanısı konulduktan sonra hastanın yönetimi tam donanımlı üçüncü basamak bir merkez tarafından yürütülmelidir.

Yazar katkısı

Araştırma fikri ve tasarımı: HÇK ve MG; veri toplama: HÇK ve MG; sonuçların analizi ve yorumlanması: HÇK ve MG; araştırma metnini hazırlama: HÇK ve MG. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

Author contribution

Study conception and design: HÇK and MG; data collection: HÇK and MG; analysis and interpretation of results: HÇK and MG; draft manuscript preparation: HÇK and MG. All authors reviewed the results and approved the final version of the manuscript.

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Kaynaklar

1. van Selm M, Kanhai HH, Gravenhorst JB. Maternal hydrops syndrome: a review. Obstet Gynecol Surv. 1991;46(12):785-8. [Crossref]
2. Braun T, Brauer M, Fuchs I, et al. Mirror syndrome: a systematic review of fetal associated conditions, maternal presentation and perinatal outcome. Fetal Diagn Ther. 2010;27(4):191-203. [Crossref]
3. Finamore PS, Kontopoulos E, Price M, Giannina G, Smulian JC. Mirror syndrome associated with sacrococcygeal teratoma: a case report. J Reprod Med. 2007;52(3):225-7.
4. Ordorica SA, Marks F, Frieden FJ, Hoskins IA, Young BK. Aneurysm of the vein of Galen: a new cause for Ballantyne syndrome. Am J Obstet Gynecol. 1990;162(5):1166-7. [Crossref]
5. Chaoui R, Bollmann R, Hoffmann H, Zienert A, Bartho S. Ebstein anomaly as a rare cause of a non-immunological fetal hydrops: prenatal diagnosis using Doppler echocardiography. Klin Padiatr. 1990;202(3):173-5. [Crossref]

6. Teles Abrao Trad A, Czeresnia R, Elrefaei A, Ibirogba ER, Narang K, Ruano R. What do we know about the diagnosis and management of mirror syndrome? J Matern Fetal Neonatal Med. 2022;35(20):4022-7. [Crossref]

7. Mohamad Zon E, Nik Lah NAZ, Hoo PS. Late-Onset Mirror Syndrome. Malays Fam Physician. 2021;16(1):129-32. [Crossref]

8. Gedikbasi A, Oztarhan K, Gunenc Z, et al. Preeclampsia due to fetal non-immune hydrops: mirror syndrome and review of literature. Hypertens Pregnancy. 2011;30(3):322-30. [Crossref]

9. Kalyon S, Gökden Y, Demirel N, Erden B, Türkyılmaz A. Chanarin-Dorfman syndrome. Turk J Gastroenterol. 2019;30(1):105-8. [Crossref]

10. Society for Maternal-Fetal Medicine (SMFM); Norton ME, Chauhan SP, Dashe JS. Society for maternal-fetal medicine (SMFM) clinical guideline #7: nonimmune hydrops fetalis. Am J Obstet Gynecol. 2015;212(2):127-39. [Crossref]

Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Kınay T, Karadeniz RS, Engin Üstün Y. A simple maneuver to facilitate delivery in shoulder dystocia. Turk J Womens Health Neonatol 2024; 6(1): 32-35.

Case Report

A Simple Maneuver to Facilitate Delivery in Shoulder Dystocia

Omuz Distosisinde Doğumu Kolaylaştıracak Basit Bir Manevra

Tuğba Kınay *[1], R. Sinan Karadeniz [1], Yaprak Engin Üstün [1]

[1] Department of Obstetrics and Gynecology, University of Health Sciences Etlik Zubeyde Hanim Women's Health Training and Research Hospital, Ankara, Türkiye

Abstract

Shoulder dystocia is an unpredictable complication of vaginal delivery and it could lead serious adverse maternal and neonatal outcomes. Prompt intervention and appropriate management of this obstetric emergency is essential to reduce the risk of adverse outcome. The maneuvers that had various advantages and disadvantages to alleviate shoulder dystocia have been described previously. In this report, we defined a new, easy to perform and noninvasive maneuver which could be used to relieve shoulder dystocia. This maneuver was successfully implemented in two nulliparous and two multiparous women who had experienced shoulder dystocia during vaginal delivery. After the diagnosis of shoulder dystocia and unsuccessful McRoberts and suprapubic pressure maneuver, the gentle upward traction on the fetal head and neck was performed in the lithotomy position. The posterior shoulder slipped forward in the sacral hollow and brought closer to the introitus with this maneuver. Thus, the anterior and posterior shoulders were no longer in the same antero-posterior plane of the pelvis. Then the gentle downward traction on the fetal head was applied until the anterior shoulder protruded through the perineum and the impacted anterior shoulder dislodged from behind the symphysis pubis. No other maneuver was needed for the completion of the delivery in these four cases, and no maternal or neonatal complication was observed. In conclusion, the presented maneuver is an easy and noninvasive maneuver. It could be easily learned with simulation training and used in the management of shoulder dystocia.

Keywords: Shoulder dystocia; maneuver; delivery

Öz

Omuz distosisi vajinal doğumun öngörülemeyen bir komplikasyonudur, anne ve yenidoğanda ciddi olumsuz sonuçlara yol açabilir. Olumsuz sonuç riskini azaltmak için bu acil obstetrik duruma hızlı müdahale ve uygun yönetim esastır. Omuz distosisini hafifletmeye yönelik çeşitli avantaj ve dezavantajları olan manevralar daha önce tanımlanmıştır. Bu raporda omuz distosisini hafifletmek için kullanılabilecek, uygulaması kolay ve noninvaziv yeni bir manevra tanımladık. Bu manevra, vajinal doğum sırasında omuz distosisi yaşayan iki nullipar ve iki multipar kadında başarıyla uygulandı. Omuz distosisi tanısı konulduktan ve McRoberts ve suprapubik basınç manevrasının başarısız olmasından sonra litotomi pozisyonunda fetal baş ve boyuna hafif yukarı traksiyon uygulandı. Bu manevra ile arka omuz sakral boşlukta öne doğru kayarak introitusa yaklaştırıldı. Böylece ön ve arka omuzlar artık pelvis içinde aynı antero-posterior düzlemde değildi. Daha sonra, obstrukte ön omuz simfiz pubisin arkasından kurtulana ve perineden dışarı çıkana kadar fetal başa hafif aşağı doğru traksiyon uygulandı. Bu dört olguda doğumun tamamlanması için başka bir manevraya ihtiyaç duyulmadı ve anne veya yenidoğanda herhangi bir komplikasyon görülmedi. Sonuç olarak sunulan manevra kolay ve noninvazif bir manevradır. Simülasyon eğitimi ile kolaylıkla öğrenilebilir ve omuz distosisi yönetiminde kullanılabilir.

Anahtar Kelimeler: Omuz distosisi; manevra; doğum

Corresponding author *: Department of Obstetrics and Gynecology, University of Health Sciences Türkiye Etlik Zübeyde Hanım Women's Health Training and Research Hospital, Ankara, Türkiye.
Email: tkinay@hotmail.com
ORCID: 0000-0001-5340-1025
DOI: 10.46969/EZH.1416052
Received: 07.01.2024 Accepted: 06.02.2024

1. Introduction

Shoulder dystocia is a poorly predictable complication of vaginal delivery. The incidence of this obstetric emergency varies from 0.2% to 3% (1). Although a number of risk factors such as maternal diabetes mellitus, fetal macrosomia, history of dystosia, precipitous or prolonged second stage of labor are known, shoulder dystocia is still unpredictable and unpreventable complication of delivery (1-3). Failed delivery of fetal shoulders after the head emerges could be the reason for serious neonatal and maternal adverse outcomes (4). Appropriate management of dystocia is essential to reduce the risk of these complications and permanent sequels in neonates. Various maneuvers to alleviate shoulder dystocia have been described in the literature previously. McRoberts maneuvers with or without suprapubic pressure is the first-line maneuver recommended by the guidelines (1,5) because it is easy to perform and noninvasive. The reported success rate of the McRoberts maneuver varies between 24–62% (6,7). When the McRoberts maneuver and suprapubic pressure are unsuccessful, second-line maneuvers such as delivery of posterior arm, Wood corkscrews maneuver, Rubin maneuver, or Zavanelli's maneuver may be implemented (5). However, these maneuvers are more complicated, difficult to perform, and invasive. In this report, we defined a new, noninvasive, and easy to perform maneuver that could be used in the management of shoulder dystocia.

2. Case Report

This new maneuver was implemented in two nulliparous and two multiparous women who had experienced shoulder dystocia during vaginal delivery at a tertiary care center. Informed consent was obtained from all women. Shoulder dystocia was diagnosed in the cases when the delivery of the fetal shoulder failed with gentle downward traction on the fetal head. The new maneuver was implemented after the dystocia could not be resolved with the McRoberts maneuver and suprapubic pressure in all women.

The verified steps of the technique are as follows (Figure 1):

1. In the lithotomy position, gentle upward traction on the fetal head and neck was applied firstly. In this step, forceful traction on the fetal head was avoided in order not to cause brachial plexus injury in the posterior arm.

2. Secondly, gentle downward traction on the fetal head was applied until the anterior shoulder protruded through the perineum.

The upward traction on the fetal head and neck enabled the posterior shoulder to slide down in the sacral hollow and to advance to the introitus. So, the shoulders were freed from being in the same anteroposterior plane of the pelvis. Then the impacted anterior shoulder could be dislodged from behind the symphysis pubis by gentle downward traction on the fetal head.

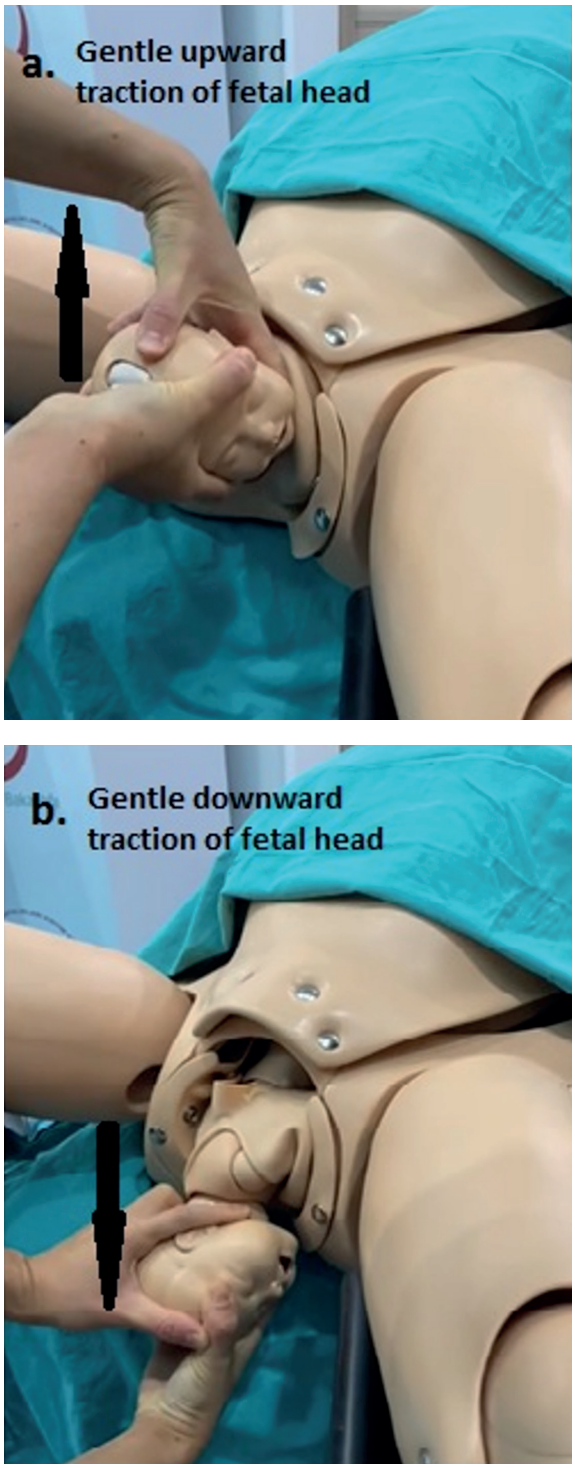


Figure 1. The technique of the new maneuver. The woman is in the lithotomy position. The gentle upward traction (a) and then the gentle downward traction (b) on fetal head were applied, respectively.

The first case was a 20-year old woman, G2P1 with a history of vaginal delivery without any complication. The Body Mass Index (BMI) of woman was 29 kg/m^2, she had no history of fetal

macrosomia or shoulder dysocia in previous delivery. At 37 2/7 weeks of gestation, spontaneous labor was initiated. The first stage of the labor lasted 2 hours and the second stage lasted less than 30 minutes. Mc Roberts maneuver and suprapubic pressure which failed was attempted by obstetrician firstly. Then a gentle upward and downward traction was applied to the fetal head, respectively. The anterior shoulder dislodged behind the symphysis pubis and became visible outside the perineum with this maneuver. Then delivery proceeded without complication. Apgar scores at 1 and 5 minute for the neonate were 9 and 9. The newborn birthweight was 3765 gr. The baby was removed in less than 30 seconds with this maneuver. No maternal and neonatal injuries were occurred.

The second case was a 22-year old woman, G2A1. The BMI was 22 kg/m^2, she had no history of diabetes mellitus. She was at 41 weeks of gestational age when the spontaneous labor was initiated. Labor induction or augmentation was not applied in this women and other cases presented. The labor was progressed normally with a 4-hour first stage and one hour second stage. The anterior shoulder that could not be delivered with Mc Roberts maneuver and suprapubic pressure was dislodged with defined new maneuver. After the anterior shoulder became visible under the symphysis pubis, the delivery was completed without any complication. The newborn birthweight was 3910 gr and the Apgar score at 1 and 5 minute were 9-10. No neonatal injury was occurred. The mediolateral episiotomy was repaired. No other laceration was observed in the postpartum pelvic examination of woman.

The third case was a G1, 19-year old woman. Her BMI was 27 kg/m^2. The spontaneous labor was initiated at 39 4/7 weeks of gestation. The first stage of labor lasted 5 hour and the second stage was 40 minutes. The fetal head was anterior occiput position during descent in this woman and the other three cases. Mc Roberts maneuver and suprapubic pressure were unsuccessful in relieving the shoulder dystocia. The anterior shoulder dislodged with the gentle upward traction and then the downward traction of fetal head. Delivery was completed without maternal and neonatal injury. Apgar scores for the neonate were 9 and 10 at 1 and 5 minute, and the newborn birthweight was 3180 gr.

The fourth case was a 28 year-old woman, G3P2 with the history of two vaginal deliveries. There was no history of shoulder dystocia in previous deliveries. The BMI of woman was 27 kg/m^2. The labor was initiated at 40 5/7 weeks of gestation spontaneously. The first stage of labor was 6 hours and the second stage lasted 15 minutes. The episiotomy was performed in this woman and the other cases. Upward- downward traction of fetal head was applied after the failed Mc Roberts maneuver and suprapubic pressure and the impacted anterior shoulder dislodged the symphysis pubis. No maternal and neonatal injury was observed after the completion of delivery. The newborn birthweight was 3610 gr, and Apgar scores at 1 and 5 minutes were 8 and 10.

3. Discussion

Shoulder dystocia is an unpredictable and unpreventable obstetric complication and various maneuvers were defined for the management up to date. Previous maneuvers have some advantages and disadvantages over each other and none of them have a 100% success rate. The presented maneuver has some advantages over the previously defined maneuvers. One of its advantages is that there is no need for assistance during implementation. One or two assistants are required for the McRoberts maneuver and suprapubic pressure which are the first-line maneuvers in the shoulder dystocia management. Another handicap of the McRoberts maneuver with suprapubic pressure is that it can cause about 10% brachial plexus injury (8). In the presented cases, no maternal or neonatal adverse outcomes were observed. However, results of larger series are required to be able to say that the obstetric complication rate is lower with this maneuver than with the others.

The initial movement of the fetal head and shoulders in the presented maneuver was similar to that in the Gaskin- all fours maneuver. As in the Gaskin-all fours maneuver (9), the fetal head is initially moved toward the symphysis pubis and the posterior shoulder advanced to the introitus with the presented maneuver. The difference between the new maneuver and the Gaskin is that the posterior shoulder does not need to be completely protruded through the perineum at this step. The other difference is that there is no need for a position change during the implementation of the new maneuver. In Gaskin—all fours maneuver, the woman is placed on her hands and knees, and it can mostly be performed in the bed (10). However, this new maneuver was carried out in the lithotomy position, and it could be easily performed both in the bed and on the delivery table without falling danger.

The American College of Obstetricians and Gynecologists recommended the delivery of the posterior arm as the next maneuver when the McRoberts maneuver and suprapubic pressure are unsuccessful (1). The success rate of this maneuver is 84% (10). Delivery of the posterior arm allows the biacromial diameter to be converted to the acromial-axillar diameter. However, the implementation could be difficult in babies with large birthweights and women with constricted pelvic anatomy due to difficulty in reaching the posterior hand. Humerus or

clavicle fracture could occur during attempts. Complete delivery of the posterior arm through the perineum is not required in the maneuver we have been described. The posterior shoulder sliding down in the sacral hollow was sufficient to alleviate the dystocia in the presented cases. Therefore, the risk of bone fracture could be significantly reduced with the new maneuver.

In the authors' experience, the presented maneuver made it easier to catch the posterior hand and delivery of the posterior arm in two cases of shoulder dystocia due to compound presentation (not discussed in this article). During upward traction of the fetal head, the hand at the behind of posterior shoulder protruded from the perineum, and the delivery of posterior arm was easily performed.

In conclusion, the presented maneuver is simple, noninvasive and no assistant required. It could be easily learned with simulation training and used to resolve the shoulder dystocia.

Author contribution

Study conception and design: TK; Draft manuscript preparation: TK and RSK; Revision and supervision: YEÜ. All authors reviewed the results and approved the final version of manuscript.

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Çalışmanın konsepti ve tasarımı: TK; Taslak yazının hazırlanması: TK ve RSK; Revizyon ve denetim: YEÜ. Tüm yazarlar sonuçları gözden geçirdi ve makalenin son versiyonunu onayladı.

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

References

1. Committee on Practice Bulletins—Obstetrics. Practice Bulletin No 178: Shoulder Dystocia. Obstet Gynecol. 2017;129(5):e123-33. [Crossref]
2. Ouzounian JG, Gherman RB. Shoulder dystocia: are historic risk factors reliable predictors? Am J Obstet Gynecol. 2005;192(6):1933-5. [Crossref]
3. Berle P, Misselwitz B. Antepartal maternal risks for shoulder dystocia. An analysis of 224 744 births spontanous and vaginal and after the 37th week of gestation born in Hessen (2002-2008). Z Geburtshilfe Neonatol. 2009;213(5):171-5. [Crossref]
4. Dajani NK, Magann EF. Complications of shoulder dystocia. Semin Perinatol. 2014;38(4):201-4. [Crossref]
5. Sentilhes L, Sénat MV, Boulogne AI, et al. Shoulder dystocia: guidelines for clinical practice from the French College of Gynecologists and Obstetricians (CNGOF). Eur J Obstet Gynecol Reprod Biol. 2016;203:156-61. [Crossref]
6. Lok ZLZ, Cheng YKY, Leung TY. Predictive factors for the success of McRoberts' manoeuvre and suprapubic pressure in relieving shoulder dystocia: a cross-sectional study. BMC Pregnancy Childbirth. 2016;16(1):334. [Crossref]
7. Spain JE, Frey HA, Tuuli MG, Colvin R, Macones GA, Cahill AG. Neonatal morbidity associated with shoulder dystocia maneuvers. Am J Obstet Gynecol. 2015;212(3):353.e1-5. [Crossref]
8. Menticoglou S. Shoulder dystocia: incidence, mechanisms, and management strategies. Int J Womens Health. 2018;10:723-32. [Crossref]
9. Bruner JP, Drummond SB, Meenan AL, Gaskin IM. All-fours maneuver for reducing shoulder dystocia during labor. J Reprod Med. 1998;43(5):439-43.
10. Hoffman MK, Bailit JL, Branch DW, et al. A comparison of obstetric maneuvers for the acute management of shoulder dystocia. Obstet Gynecol. 2011;117(6):1272-8. [Crossref]

Türk Kadın Sağlığı ve Neonatoloji Dergisi

To cite this article: Finci AT, Aydın N. Lessons learned from three patients who underwent cesarean section and cardiac valvular surgery simultaneously: anesthesiologists' perspective. Turk J Womens Health Neonatol 2024; 6(1): 36-43.

Case Report

Lessons Learned From Three Patients Who Underwent Cesarean Section and Cardiac Valvular Surgery Simultaneously: Anesthesiologists' Perspective

Eş Zamanlı Sezaryen ve Kalp Kapak Ameliyatı Geçiren Üç Hastadan Öğrenilen Dersler: Anestezistlerin Bakış Açısı

Alpin Tamay Finci [1], Nevin Aydın [2]*

[1] Department of Anaesthesiology and Reanimation, Sait Ertürk Etimesgut Public Hospital, Ankara, Türkiye
[2] Department of Anaesthesiology and Reanimation, Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Türkiye

Abstract

Background: Cardiac valvular disease constitutes a challenge during pregnancy. Herein, we present our experience with three patients who underwent caesarean section and cardiac valvular surgery simultaneously. The purpose of this case series was to outline the clinical characteristics and to highlight the surgical/anesthesiologic pitfalls to be considered in patients who will undergo cardiac valvular surgery and caesarean section simultaneously.

Methods: This retrospective case series was implemented using data extracted from the medical files of three patients who underwent cardiac valvular surgery and caesarean section in the obstetrics and gynecology and cardiovascular surgery departments of our tertiary care center. Demographic data, history, echocardiographic findings, surgical and anesthesiologic techniques as well as perioperative information and therapeutic outcomes were recorded.

Results: Three pregnant women with an average age of 33.67 years were diagnosed with various cardiac valvular pathologies on the 3rd trimester. Owing to their diminished cardiac reserves and clear indications for cesarean section, the patients underwent cardiac valvular surgery subsequent to the cesarean section. Procedures were completed successfully on all patients and mothers and infants were discharged after a maternal follow-up in intensive care unit.

Conclusion: We suggest that cardiac valve surgery can be performed simultaneously just after cesarean section in selected cases. Risks and benefits must be analyzed well prior to the decision making for the absolute necessity of the invasive procedure. Close collaboration between disciplines, well equipped referral centers, trained personnel and increased awareness on possible complications are the key points for successful surgical management of pregnant women with cardiac valve disease.

Keywords: Cardiac valvular disease; surgery; pregnancy; cesarean section; anesthesia

Corresponding author *: Department of Anaesthesiology and Reanimation, Kanuni Sultan Süleyman Training and Research Hospital, İstanbul, Türkiye.
Email: nevinaydin4334@gmail.com
ORCID: 0000-0003-0189-5865
DOI: 10.46969/EZH.1377297
Received: 19.10.2023 Accepted: 16.02.2024

Öz

Amaç: Kalp kapak hastalıkları gebelik sırasında önemli bir sorundur. Burada eş zamanlı olarak sezaryen ve kalp kapağı ameliyatı geçiren üç hastayla ilgili deneyimimizi sunuyoruz. Bu vaka serisinin amacı, eş zamanlı olarak kalp kapağı cerrahisi ve sezaryen operasyonu geçirecek hastalarda klinik özelliklerin ana hatlarını çizmek ve dikkate alınması gereken cerrahi/anesteziyolojik durumları vurgulamaktı.

Yöntem: Bu retrospektif vaka serisi, üçüncü basamak merkezimizin kadın hastalıkları ve doğum ve kalp damar cerrahisi bölümlerinde kalp kapak cerrahisi ve sezaryen operasyonu geçiren üç hastanın tıbbi dosyalarından elde edilen veriler kullanılarak uygulandı. Demografik veriler, öykü, ekokardiyografik bulgular, cerrahi ve anestezi teknikleri ile perioperatif bilgiler ve tedavi sonuçları kaydedildi.

Bulgular: Yaş ortalaması 33,67 olan üç gebeye 3. trimesterde çeşitli kalp kapak patolojileri tanısı konuldu. Kalp rezervlerinin azalması ve sezaryen endikasyonunun net olması nedeniyle hastalara sezaryen sonrası kalp kapağı ameliyatı uygulandı. Tüm hastaların işlemleri başarıyla tamamlandı ve anne ile bebekleri yoğun bakımda takibinin ardından taburcu edildi.

Sonuç: Seçilmiş olgularda sezaryen sonrası eş zamanlı olarak kalp kapak cerrahisinin yapılabileceğini düşünüyoruz. İnvaziv işlemin mutlak gerekliliği için karar vermeden önce riskler ve faydalar iyi analiz edilmelidir. Disiplinler arası yakın işbirliği, iyi donanımlı sevk merkezleri, eğitimli personel ve olası komplikasyonlar konusunda artan farkındalık, kalp kapak hastalığı olan hamile kadınların başarılı cerrahi tedavisinin kilit noktalarıdır.

Anahtar Kelimeler: Kalp kapak hastalığı; ameliyat; gebelik; sezaryen; anestezi

1. Introduction

Valvular heart disease not only represents a significant cause of cardiac disease in pregnancy, but it also poses a critical challenge to the anesthesiologist during labor and delivery. A good understanding of the pathophysiology, in conjunction with the remarkable physiologic changes associated with pregnancy, is critical for management of these patients. Therapeutic aims involve preservation of the hemodynamic and ventilatory parameters within an acceptable boundary and proper conduction of labor and postpartum period (1).

The prevalence of cardiac disease in pregnancy varies between 0.4 to 4.1% (2-4). In the developed world, congenital heart disease has become the major cause of cardiac disease; while rheumatic heart disease appears as the major cause of cardiac disease in pregnancy in developing countries (5). Counseling of women with cardiac pathologies should be performed before conception and may include a detailed history, and evaluation for invasive procedures better performed during non-pregnant state to avoid potential fetal risks. Patients with surgically correctable lesions are advised to undergo repair before pregnancy to improve maternal and fetal outcomes (1,6).

The main physiological challenges during pregnancy have anesthetic implications for pregnant women with cardiac diseases. These challenges include an increase in intravascular volume, decrease in systemic vascular resistance, fluctuations in cardiac output, hypercoagulability and diminished functional residual capacity (1). The most frequent causes of maternal death, including embolism and hemorrhage, have remained stable, but maternal mortality due to cardiac causes has increased (1). Additionally, women with cardiovascular diseases are more likely to experience abortion and give birth to children who are small for gestational age (6). Earlier cardiovascular events or arrhythmias, advanced heart failure, cyanosis and ejection fraction < 40% are predictors for cardiovascular hazards in these patients (7).

Due to the possibility of serious complications from pregnancy and cardiac disease, these patients should undergo a detailed history and a meticulous examination. Referral to higher centers with adequate monitoring facilities and well-trained personnel for peripartum and perinatal care is crucial. Close monitoring is necessary for both the mother and fetus throughout the peripartum period. The anesthesiology team should aim to avoid a decrease in systemic vascular resistance and prevent hypoxia, hypercapnia and acidosis (1).

It is clear that pregnant women with valvular disease need specialized care. Management during pregnancy involves replacement of any contraindicated medications with safer alternatives, optimization of loading conditions, careful monitoring and aggressive treatment of any exacerbating factors. In some circumstances, surgical intervention may be necessary during pregnancy. Labor a and delivery mostly require invasive hemodynamic monitoring and a multi-disciplinary approach to achieve optimal maternal and fetal outcomes (8).

Regurgitant valve disease carries a lower risk for poor maternal and fetal outcomes than stenotic lesions. Maternal risk is dependent on the severity of the regurgitation symptoms and left ventricular function. Patients with severe disease and symptoms, or impaired left ventricular function should be advised to have surgery prior to pregnancy. During pregnancy, close follow up on a monthly basis is recommended. Medical therapy is usually sufficient to manage symptoms of fluid overload (9).

In general, vaginal delivery is the preferred method, and in symptomatic patients, epidural anesthesia and a shortened second stage is advisable. Most patients with simple congenital heart lesions tolerate pregnancy well (9). Nevertheless, for patients with complex lesions and diminished cardiac reserve, cesarean section and cardiac valvular surgery may be an alternative. For these cases, decision making should be based on assessment of efficacy and safety.

Herein, we present our experience with 3 patients who underwent cesarean section and cardiac valvular surgery simultaneously. Summarization of the principles and establishment of a practical approach for evaluation of risks in pregnant women with cardiac valvular diseases are performed. Hopefully, this case series will contribute to the follow-up and management of pregnant women with valvular heart disease and aid in selection of patients who are appropriate for cardiac valvular surgery together with cesarean section. Thereby, avoidance or minimization of complications, morbidity and mortality can be possible.

This retrospective case series was implemented using data extracted from the medical files of 3 patients who underwent cardiac valvular surgery and cesarean section in the obstetrics and gynecology and cardiovascular surgery departments of our tertiary care center. Demographic data, history, echocardiographic findings, surgical and anesthesiologic techniques as well as perioperative information and therapeutic outcomes were recorded. Approval of the institutional review board had been obtained before the study.

2. Case Presentations

All patients underwent elective conditions.

Case 1

A 39-year-old pregnant woman with a body-mass index (BMI) of 25.46 had advanced mitral stenosis and mitral insufficiency in addition to a moderate degree of tricuspid insufficiency. The patient, whose gravity was 1 and parity 0, was 30 weeks pregnant. The patient had previously experienced a cerebrovascular event and had undergone a prosthetic aortic valve operation 4 years ago. Her complaint related to her illness was shortness of breath while lying down at night. She had been diagnosed with asthma previously and her ejection fraction (EF) was 65%. In the preoperative evaluation of the patient, the ASA score was 3. An echocardiograph performed prior to the operation revealed a mitral valvular area of 1.2 cm2, a maximum/mean gradient of 34/15 mmHg and a systolic pulmonary artery pressure of 50 mmHg. After cesarean section, the patient underwent mitral and tricuspid valvular replacements (DeVega annuloplasty). A no.29 prosthetic valve was used for replacement of the mitral valve. The total duration of operation was 4 hours. Catheterization was performed to monitor central venous pressure. Total dose of oxytocin administered prior to onset of pump was 30 U. Dobutamine DBL (Dobutamine HCL 250 mg 20 ml, Orna A.S , Turkey) was administered at a dose of 3 µg/kg/minute for inotropic support at the end of pump. Cardioplegia was performed once during surgery using 20 cc KCl and 10 cc Mg. The patient's postoperative transthoracic echocardiography showed mild insufficiency flow in the tricuspid valve, high gradient prosthetic aortic valve (made 4 years ago), patent foramen ovale, mild mitral regurgitation ,normally functioning metallic MVR , mild aortic regurgitation, and dilatation in the left atrium were observed. After staying on mechanical ventilation for 1 day, intensive care treatment continued for 6 days and she was discharged on the 14th day. Both the mother and the infant survived on 1st year postperatively.

Case 2

A 40-year-old pregnant with a BMI of 27.55 was diagnosed with aortic aneurysm and aortic insufficiency. The patient , with a gravity of 5 and parity of 4, was 36 weeks pregnant.She had been diagnosed with aortic aneurysm 1 year ago, complained of chest pain. The ASA score was 3. Echocardiography demonstrated aortic insufficiency and dilatation of aortic root and ascending aorta. Systolic pulmonary artery pressure was 214 mmHg. Following cesarean section, repair of ascending and transverse aorta with graft and aortic valve replacement were performed. The total duration of operation was 4 hours and cardioplegia was performed once during surgery. No inotropic agents were administered postoperatively but fibrinogen was applied .In the postoperative transthoracic echocardiography evaluation, pleura and pericardium were normal, an appearance compatible with non-obstructive pannus in the subvalvular

area, normal left ventricularsystolic function, normofunctional AVR, high gradient aortic prosthetic valve, mild tricuspid and mitral regurgitation was detected. The patient's mechanical ventilation duration was 1 day, intensive care treatment duration was 3 days, and hospital stay was 9 days. The patient and the infant are alive and free of any complications 1 year following surgery.

Case 3

A 22-year-old pregnant woman with a BMI of 22.05 was diagnosed with mitral insufficiency, mitral stenosis, aortic insufficiency and tricuspid insufficiency. The patient with a gravidity of 1 and parity of 0 was 34 weeks pregnant. She had chronic atrial fibrillation was being followed up by the cardiology department. The patient did not mention any specific complaints. The ASA score was 4.Echocardiography was consistent with previously repaired mitral and aortic valves as well as aortic and tricuspid insufficiencies. The ejection fraction and systolic pressure of pulmonary artery were 60% and 60 mmHg, respectively. After cesarean section, replacement of mitral valve (no.29) and tricuspid valve (no.35) together with repair of aortic valve were performed .Dopamin Fresenius (Dopamin HCL,200 mg 5 ml, Fresenius Kabi, Austria) was introduced at a dose of 3 µg/kg/minute for inotropic support postperatively. After transfer to ICU, the mother and the neonate were discharged without any complications. In the patient's postoperative transthoracic echocardiography normofunctional prosthetic mitral valve, trace aortic valve insufficiency, normofunctional tricuspid ring plasty were detected. The patient was discharged in 7 days after 1 day of mechanical ventilation support and 3 days of intensive care treatment.They both are alive on the 2nd year after operation.

When the patients were brought to the operating table, priorly using 16-18G angiocath vascular access was opened priorly from the right, and left extremities, Isolyte S(PH 7.4, Eczacıbaşı-Baxter Turkey) was infused through one, and Gelofusine (gelatin, Braun, Germany) through the veins of the other extremity. Then 0.5 cc 2% Jetmonal (20 mg 10 ml, Adeka A.S, Turkey) was injected using a dental needle on the radial region, and arterial cannula was inserted under sterile conditions. After arterial monitorization, , the induction phase was performed. Induction doses of Pental (0.5 gr, Thiopental Sodium, Menarini A.S,Turkey) 3 mg/kg, Ketalar (Ketamin HCL, 500mg, Pfizer,USA) 0.5 mg/kg, Esmeron (Rocuronium Bromur, 100mg 10 ml Organon, Holland) 0.5 mg/kg were applied, and 3 minutes later, the patient was intubated.

Before cesarean section, an external pacemaker was subcutaneously implanted on the dorsal aspect of the thorax (Possible deterioration of EF towards the end of the pregnancy was detected, and anesthesiologist was warned that the pregnant patient whose 3 cardiac valves would be changed may suffer from cardiac arrest). Before proceeding with surgery transurethral catheterization was performed simultaneously with CVP catheter insertion. Disinfectant solutions were applied both to the chest, and surgical field of cesarean section, and covered with sterile drape. Priorly C-S was performed. After delivery of the baby, Sojourn(Sevofluran %100 250 ml ,Adeka A.S , Turkey) 2% and 2/2 oxygen-air mixture were delivered. All inotropic agents were kept ready. After delivery, 30 U of oxytocin Synpitan fort (oxytocin, 5 IU/mL, Deva A.S, Istanbul, Turkey) was added into Isolyte S which is used as a maintenance fluid. After delivery, until the end of the section (within 15-20 minutes) 50 µg /kg fentanyl was injected. Then, cardiac surgery was proceeded with.

During sternotomy, a combination of Demizolam (Midazolam, 15 mg 3 ml, Dem A.S, Turkey) 2 mg, Talinat (Fentanyl, 0.1 mg 2 ml ,Vem A.S ,Turkey) 100 µg and Blok-L(Vecuronium ,10 mg, Gensenta A.S,Turkey) 2 mg was injected. At every half an hour, the same drugs were administered, and anesthesia was maintained. Nevparin (Heparin Sodium, 25000 IU ,Gentansa A.S , Turkey) was administered at a dose of 300-400 U/kg. Protamine ICN (Protamine HCL, 5000 IU 5 ml , Meda Pharma A.S, Turkey) dose was given as 1.2 times higher than the heparin dose. Off-pump patients with a normal creatinine level received Transamine (Tranexamic acid 250 mg, Actavis, Ireland) at a dose of 15mg/kg. Generally, a single session of blood cardioplegia was used intraoperatively.

The patient without aortic insufficiency received KCl, and Mg at doses of 3 mg/kg, and 1.5 mg/kg, while patients with aortic insufficiency were given KCl, and Mg at doses of 4mg/kg, and 2 mg/kg, respectively. The dose of cardioplegia solution was 10 mg/kg. Blood was used as cardioplegia solution. After the surgery the patients were intubated, and transported into ICU. An overview of baseline descriptive data, clinical data and hematologic parameters are presented in In Table 1, age, body-mass index, gestational weeks, diagnosis for valvular heart disease, type of operation performed, ejection fraction, doses of heparin and protamine administered, agents administered for induction and maintenance of general anesthesia, amount of intravenous fluids introduced and inotropic agents given are demonstrated. Preoperative and postoperative laboratory findings are shown in Table 2.

Table 1. An overview of baseline descriptives, clinical and perioperative data in our series			
	Patient 1	Patient 2	Patient 3
Age (years)	39	40	22
BMI (kg/m^2)	25.46	27.55	22.03
ASA Score	3	3	4
Diagnosis	MS, MI, TI	AA, AI	MI, MS, AI, TI
Gestasyonel Age (Weeks)	30	36	34
Operation	CS, MVR, TVR (DE VEGA ANNULOPlASTY)	CS, AVR, AARG	CS, MVR, TVR, AVRp
EF %	65	65	60
Transfusion	5 U ES	3 U ES, 2 U FFP	2 U ES , 1 U FFP
Heparin Dose (U)	25000	25000	35000
ACT (Seconds) Before Pump	119	138	114
ACT (Seconds) After Pump	490	100	148
Induction of Anesthesia	Ketamine, Thiopental, Rocuronium	Ketamine, Thiopental, Rocuronium	Ketamine, Thiopental, Rocuronium
Maintenance of Anesthesia	Sevoflurane, Fentanyl, Midazolam, Vecuronium	Sevoflurane, Fentanyl, Midazolam, Vecuronium	Sevoflurane, Fentanyl, Midazolam, Vecuronium
Protamin (U)	45000	30000	35000
IV Fluids (CC)	1500	1700	2200
Urine Output (CC)	1100	300	1800
P/O Drug	-	Fibrinogene	-
Survival	Yes	Yes	Yes
BMI: body-mass index; ASA: American Society of Anaesthesiologists; CS: cesarean section; AA: aortic aneurysm; AI: aortic insufficiency; MS: mitral stenosis; MI: mitral insufficiency; TI: tricuspid insufficiency; MVR: mitral valve replacement; TVR: tricuspid valve replacement; AVR: aortic valve replacement; AVRp: aortic valve repair; AARG: ascending aorta repair with graft; EF: ejection fraction; ACT: activated clotting time; IV: intravenous; PO: postoperative; U: units; ES: erythrocyte suspension; FFP: fresh frozen plasma			

3. Discussion

The timing and mode of delivery should be determined by a team consistent of the obstetrician, cardiologist, and obstetric anesthesiologist. Even though vaginal delivery with appropriate anesthesia and shortening of the second stage is safer and is the choice in the majority of patients, cesarean section is reserved for obstetric indications and in the occasional patient with cardiac instability (10). Hemodynamic monitoring during labor and delivery must be performed in symptomatic patients and in cases with moderate/severe valvular stenosis, left ventricular dysfunction, and pulmonary hypertension (10,11).

Cardiac disease remains a noteworthy problem for both the obstetric care team and anesthesiologist. In spite of advances in medical technology and healthcare, there is still a substantial burden in terms of morbidity and mortality attributed to cardiac problems during pregnancy. The obstetric anesthesiologist may play an important role in the care of these patients and contribute significantly to the reduction of potential risks for both the mother and fetus. Efficient of relief of pain, prevention of pulmonary hypertension, hypoxia and myocardial depression are among the tasks to be fulfilled during administration of anesthesia in pregnant women. Furthermore, cesarean section and cardiac valvular surgery may be performed in selected patients with obstetric indications for cesarean section and with severe cardiac insufficiency (12).

Hopefully, our preliminary data extracted from this case series may be useful for determination of patients who are appropriate for cesarean section and cardiac valvular surgery simultaneously. In these procedures, the anesthesiologist will

Table 2. Preoperative and postoperative laboratory finding						
	Preoperative			Postoperative		
	Patient 1	Patient 2	Patient 3	Patient 1	Patient 2	Patient 3
WBC (x10^3/μL)	9.17	7.64	12.4	6.96	12.16	16.9
Hemoglobin (gr/dL)	11	11.8	10.1	9.1	9	9.2
PLT (10^3/mm^3)	125	192	184	335.7	104	145.6
Glucose (mg/dL)	90	102	178	86	132	134
Na (mmol/L)	130	131	134	142	140	134
K (mmol/L)	4.1	4.8	4.6	4.7	4.3	3.8
AST (U/L)	17	22	15	14	40	16
ALT (U/L)	14	31	7	16	27	12
Fibrinogen (mg/dL)	343	337	332	271	310	321
Lactate (mmol/L)	0.90	1.36	2.39	1.57	2.31	2.33
CRP (mg/dL)	3.42	2.21	4.84	64	108.7	226
APTT (s)	25	27.7	29.1	37.7	31.5	33.4
PT (s)	11.7	11	12.8	22.1	12.4	14.3
INR	0.88	0.82	0.97	1.87	0.95	0.86
Urea (mg/dL)	14	16	14.2	17	22	26
Creatinine (mg/dL)	0.37	0.61	0.34	0.47	0.66	0.4

need to overcome hemodynamic problems attributed to both pregnancy and prosthesis. A careful anticoagulant regimen will be essential to decrease the risk of thromboembolism. Moreover, congestive heart failure, pericarditis, myocarditis, upper respiratory tract infection and anemia may occur after cesarean section and valvular surgery. The anesthetic management must be in harmony with the cardiovascular therapy of the patient.

Maintenance of hemodynamic parameters in conjunction with balance of maternal and fetal needs is the key point during simultaneous performance of cesarean section and cardiac valvular surgery. An understanding of obstetric cardiovascular pharmacology and physiology is crucial for selection of the suitable anesthetic method. Cardiac failure may occur at any time during pregnancy, but it is more commonly encountered in the third trimester. Ideally, induction of general anesthesia must keep the patient's heart rate and blood pressure within previously established limits. The onset of surgical stimulation may overcome the decrease in systemic vascular resistance and diminish the need for medical support (13).

In pregnant women with valvular heart disease, the key points to achieve favorable pregnancy outcomes are accurate diagnosis for severity of valvular disease, pre-conception evaluation and counselling, and referral of the women with highest risk to centers with expertise in the management of these patients. Valvular disease must be classified with respect to its hemodynamic effects and the involvement of the valve. Normal hemodynamic changes of pregnancy can deteriorate cardiac symptoms in previously stable women or may exacerbate symptoms in those who had symptoms before pregnancy (8,14). Preconceptual planning should include counselling each woman about the risks of pregnancy, optimization of the cardiac condition, and establishment of careful monitoring and treatment. Some women are diagnosed for the first time with valvular disease due to hemodynamic decompensation during pregnancy. On the other hand, some cases with valvular disease may present for medical evaluation only after pregnancy. It is obvious that the evaluation and treatment of these patients constitute a challenge in terms of obstetric, cardiovascular and anesthetic aspects (8,15).

Hemodynamic changes during pregnancy and labour bring about a considerable demand on cardiac function in a patient with valvular disease. This change necessitates invasive hemodynamic monitoring and aggressive medical treatment in the peripartum period. If a delivery is complicated by excessive blood loss, infection, or arrhythmia, these demands will be further amplified (8).

We suggest that owing to the greater hemodynamic changes and more significant blood loss, cesarean section should be reserved for obstetric indications. Availability of intensive care unit for both the mother and the fetus and increased alertness in the occurrence of any complications are other critical issues to be remembered. Patients should be closely monitored in terms of inotropic support and adjustment of activated clotting time.

Patients with symptomatic, severe left-sided valvular obstruction are vulnerable to cardiovascular events during pregnancy (14). Invasive procedures are generally preferred if medical management fails. Thus, the second trimester may be the optimal time for surgical intervention since organogenesis is finished and the cardiac positioning is not influenced by the gravid uterus. The type of valvular disease is another important aspect fo the formulation of delivery plan and determination of the therapeutic strategy for valvular disease. Regurgitant lesions and right sided lesions are usually more tolerable in pregnancy due to the placenta-related decrease in systemic vascular resistance which alleviates the hazardous effects of increased plasma volume. Invasive monitoring with an arterial pressure line may be helpful in patients where sudden blood pressure changes may have significant hemodynamic consequences. Postpartum hemodynamic shifts associated with blood loss and placental venous return can be deleterious in the first few days postpartum and are the period with the highest risk of congestive heart failure and arrhythmia. Specifically, patients with regurgitant lesions may need diuresis or afterload reducers during this period. Right-sided heart valvular lesions are usually well tolerated in pregnancy. Symptomatic individuals with mitral regurgitation, however, are at an increased risk of developing heart failure during pregnancy and should undergo repair or replacement of the mitral valve before pregnancy (14,15).

This case series has certain limitations such as retrospective design, small sample size, and information limited to the experience of a single institution. Moreover, the influences of environmental, social and ethnic factors must be considered during the interpretation and extrapolation of our data to larger populations.

In conclusion, a comprehensive understanding of physiology of pregnancy and the pathophysiologic basis of valvular heart disease is of utmost importance for anesthesiologists, obstetricians, cardiologists and cardiovascular surgeons involved in the healthcare of pregnant women with valvular heart disease. If obstetric indications are present, cardiac valve surgery can be performed simultaneously just after cesarean section in selected cases. Risks and benefits must be analyzed well prior to the decision making for the absolute necessity of the invasive procedure. Close collaboration between disciplines, well equipped referral centers, trained personnel and increased awareness of possible complications are the key points for the successful surgical management of pregnant women with cardiac valve disease.

Author contribution

Study conception and design: NA and ATF; data collection: ATF; analysis and interpretation of results: NA and ATF; draft manuscript preparation: NA. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Kanuni Sultan Süleyman Training and Research Hospital Noninterventional Studies Ethics Committee (Protocol no. 157/05.05.2021).

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

Yazar katkısı

Araştırma fikri ve tasarımı: NA ve ATF; veri toplama: ATF; sonuçların analizi ve yorumlanması: NA ve ATF; araştırma metnini hazırlama: NA. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

Etik kurul onayı

Bu araştırma için Kanuni Sultan Süleyman Eğitim ve Araştırma Hastanesi Girişimsel Olmayan Çalışmalar Etik Kurulundan onay alınmıştır (Karar no: 157/05.05.2021).

Finansal destek

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

Çıkar çatışması

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

References

1. Maitra G, Sengupta S, Rudra A, Debnath S. Pregnancy and non-valvular heart disease--anesthetic considerations. Ann Card Anaesth. 2010;13(2):102-9. [Crossref]
2. McFaul PB, Dornan JC, Lamki H, Boyle D. Pregnancy complicated by maternal heart disease. A review of 519 women. Br J Obstet Gynaecol. 1988;95(9):861-7. [Crossref]
3. Tan J, de Swiet M. Prevalence of heart disease diagnosed de novo in pregnancy in a West London population. Br J Obstet Gynaecol. 1998;105(11):1185-8. [Crossref]
4. Sullivan JM, Ramanathan KB. Management of medical problems in pregnancy-severe cardiac disease. N Engl J Med. 1985;313(5):304-9. [Crossref]
5. Gianopoulos JG. Cardiac disease in pregnancy. Med Clin North Am. 1989;73(3):639-51. [Crossref]
6. Weiss BM, Hess OM. Pulmonary vascular disease and pregnancy: current controversies, management strategies, and perspectives. Eur Heart J. 2000;21(2):104-15. [Crossref]
7. Siu SC, Sermer M, Colman JM, et al. Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation. 2001;104(5):515-21. [Crossref]
8. Stout KK, Otto CM. Pregnancy in women with valvular heart disease. Heart. 2007;93(5):552-8. [Crossref]
9. Anthony J, Osman A, Sani MU. Valvular heart disease in pregnancy. Cardiovasc J Afr. 2016;27(2):111-8. [Crossref]
10. Hameed A, Karaalp IS, Tummala PP, et al. The effect of valvular heart disease on maternal and fetal outcome of pregnancy. J Am Coll Cardiol. 2001;37(3):893-9. [Crossref]
11. Elkayam U, Bitar F. Valvular heart disease and pregnancy part I: native valves. J Am Coll Cardiol. 2005;46(2):223-30. [Crossref]
12. Ostheimer GW, Alper MH. Intrapartum anesthetic management of the pregnant patient with heart disease. Clin Obstet Gynecol. 1975;18(3):81-97. [Crossref]
13. Roberts SL, Chestnut DH. Anesthesia for the obstetric patient with cardiac disease. Clin Obstet Gynecol. 1987;30(3):601-10. [Crossref]
14. Safi LM, Tsiaras SV. Update on Valvular Heart Disease in Pregnancy. Curr Treat Options Cardiovasc Med. 2017;19(9):70. [Crossref]
15. Windram JD, Colman JM, Wald RM, Udell JA, Siu SC, Silversides CK. Valvular heart disease in pregnancy. Best Pract Res Clin Obstet Gynaecol. 2014;28(4):507-18. [Crossref]