



Do Urgent Caesarean Sections Have a Circadian Rhythm?

Acil Sezaryen Operasyonlarının Sirkadiyen Bir Ritmi Var mı?

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Objective: The primary goal of the present study was to demonstrate the existence of a possible circadian variation in urgent operative deliveries.

Methods: All urgent caesarean sections between 1 January 2014 and 1 January 2015 with known exact onset times of operation were included in this retrospective study. Cases that were previously scheduled for elective caesarean section were excluded. Information regarding age, delivery date, onset time of operation and type of anaesthesia was collected from the database. Analyses were completed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 20.0 software. The statistical significance for all analyses was set at $p < 0.05$.

Results: A total of 285 urgent caesarean section deliveries were included in the study. There were 126 (44.2%) deliveries during the day shift and 159 (55.8%) during the night shift. 80 patients (28.1%) received general anaesthesia and 65 (22.8%) received spinal anaesthesia in the morning shift, whereas 54 patients (18.9%) received general anaesthesia and 86 (30.2%) received spinal anaesthesia during the night shift.

Conclusion: The present study suggested that urgent caesarean sections revealed a circadian rhythm during the day.

Keywords: Caesarean section, anaesthesia, general, spinal

Amaç: Bu çalışmanın birincil amacı acil sezaryen ameliyatlarının olası sirkadiyen değişimlerini ortaya çıkarmaktır.

Yöntemler: Bu retrospektif çalışmaya, 1 Ocak 2014 ile 1 Ocak 2015 tarihleri arasındaki ameliyat başlangıç saatleri kesin olarak bilinen tüm acil sezaryen doğumlar dahil edildi. Daha öncesinde elektif olarak sezaryen planlanan vakalar çalışma dışı bırakıldı. Yaş, doğum tarihi, girişim başlangıç saati, ve anestezi tipi verilerden elde edildi. Analizler Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, ABD) versiyon 20,0 programı ile tamamlandı. Tüm analizlerde istatistik anlamlılık $p < 0,05$ olarak kabul edildi.

Bulgular: Bu çalışmaya toplam 285 sezaryen doğum dahil edildi. Gündüz vardiyasında 126 (%44,2) doğum var iken, gece vardiyasında 159 (%55,8) vardı. Gece ve gündüz vardiyası boyunca; gündüz vardiyasında 80 (%28,1) hastaya genel anestezi ve 65 (%22,8) hastaya spinal anestezi uygulanmış iken, gece vardiyasında 54 (%18,9) hastaya genel anestezi ve 86 (%30,2) hastaya da spinal uygulanmıştır.

Sonuç: Bu çalışma; acil sezaryen ameliyatlarının gün boyunca sirkadiyen bir ritm gösterdiğini düşündürmektedir.

Anahtar kelimeler: Sezaryen, anestezi, genel, spinal

Introduction

Caesarean section is one of the most commonly performed surgical procedures in women in developing and low-income countries (1). Studies reported a caesarean section rate of 15% worldwide, ranging between 3.5% and 29.2% in Africa and Latin America (2). Further, it ranges from 20% to 25% in countries including the United States of America, United Kingdom and China (3–5). A study conducted by Belizán et al. (6) revealed a range from 1.6% to 50% in Latin America, and a large number of the caesarean sections were performed in private hospitals.

In the United States, over 1.3 million women undergo caesarean section per year, with the risks of intraoperative damage to organs, bleeding, infection, thromboembolism and anaesthesia complications. As the procedure may be elective or in cases of an emergency, it is often performed as an emergency intervention after hours while the expert personnel cannot be urgently available (7). The timing of the intervention is affected by various factors, including whether the hospital is private or public, work load at the hospital, and fatigue among the emergency team (8, 9). Working hours and physician's availability may be the most evident determinants of the intervention time. It can be difficult to get access to the available operating rooms and health-care professionals involved in obstetrics in the late hours of the day. This was evident by the decline in the rate of cae-

sarean procedures at night (10). In a scientific base, emergency in deliveries should follow a circadian route, which should not be impaired by environmental factors. However, the definition of 'emergency' may be altered by temporal variations or the availability of the emergency team (11, 12).

Therefore, the aim of the present study was to elucidate the existence of a possible circadian variation in urgent operative deliveries.

Methods

The Medical Research and Application Centre at Gaziosmanpasa University is a tertiary care teaching public hospital. The morning shift in the delivery room begins at 08:00 and ends till 16:00. From 16:00 to 08:00 (night shift), a resident team is on duty with senior staff on call. After approval from the Gaziosmanpasa University Clinical Research Ethics Committee (15-KAEK-134), all urgent deliveries between 1 January 2014 and 1 January 2015 with a known exact onset time of operation were included in this retrospective study. Cases that were previously scheduled for elective caesarean section were excluded. Information regarding age, delivery date, onset time of operation and type of anaesthesia was collected from the database.

Statistical analysis

Normality and variance were tested using the One-Sample Kolmogorov-Smirnov, skewness and kurtosis were measured, and histograms were constructed for each variable. Quantitative data were presented as means±standard deviation, and qualitative data as frequency and percentage. Descriptive statistical techniques were used to evaluate all data. Analyses were completed using the Statistical Package for Social Sciences (SPSS Inc; Chicago, IL, USA) version 20.0 software. The statistical significance for all analyses was set at $p < 0.05$.

Results

A total of 285 urgent caesarean section deliveries were included in the study. Patient characteristics are presented in Table 1.

There were 126 (44.2%) deliveries during the day shift and 159 (55.8%) during the night shift (Figure 1). 80 patients (28.1%) received general anaesthesia and 65 (22.8%) received spinal anaesthesia during the morning shift, and 54 patients (18.9%) received general anaesthesia and 86 (30.2%) received spinal anaesthesia during the night shift. Figure 2 shows the hourly changes in the number of caesarean sections. The rate of urgent caesarean sections increased between 10:00 and 11:00, reached a peak between 15:00 and 16:00 and remained high until 23:00. The lowest rate of caesarean sections was observed between 6:00 and 08:00. General anaesthesia was predominantly administered in the morning shifts until 18:00, and spinal anaesthesia was the preferred anaesthesia technique during the night shifts (Figure 3). The monthly distribution of caesarean sections revealed a decrease from January to May and a marked peak in June and August with a continued rise from September to November (Figure 4).

Discussion

The present study revealed that the distribution of caesarean sections varied during the day. Moreover, it was shown that general anaesthesia was more generally administered in the day shifts than in night shifts. The variability of urgent caesarean sections may strongly be associated with biological

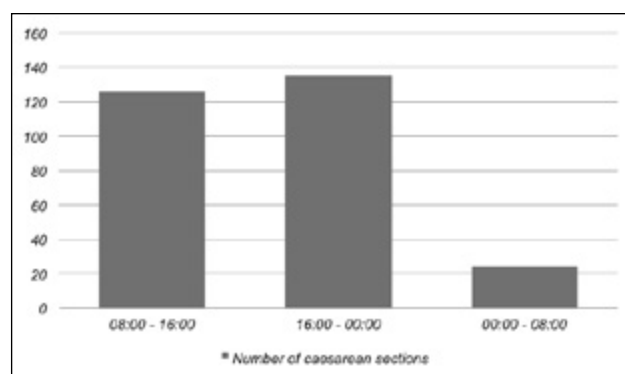


Figure 1. The distribution of caesarean sections during the day and night shifts

Table 1. Patient characteristics

	Mean±SD	95% CI	Median
Age (years)	30.18±5.63	29.52 – 30.84	30
Anaesthesia type (n, %)	General Anaesthesia	134 (47%)	
	Spinal Anaesthesia	151 (53%)	
Caesarean indications (n, %)	Previous caesarean section	147 (51.5%)	
	Foetal distress	66 (23.1%)	
	Presentation abnormalities	28 (9.8)	
	Hypertensive disorders of pregnancy	16 (5.6%)	
	Cephalopelvic disproportion	16 (5.6%)	
Placental abnormalities	12 (4.4%)		

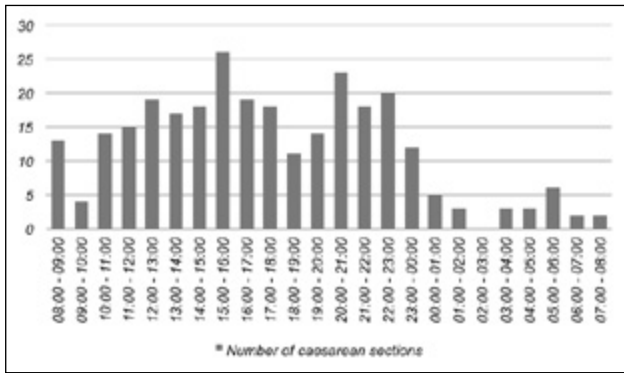


Figure 2. The hourly distribution of caesarean sections

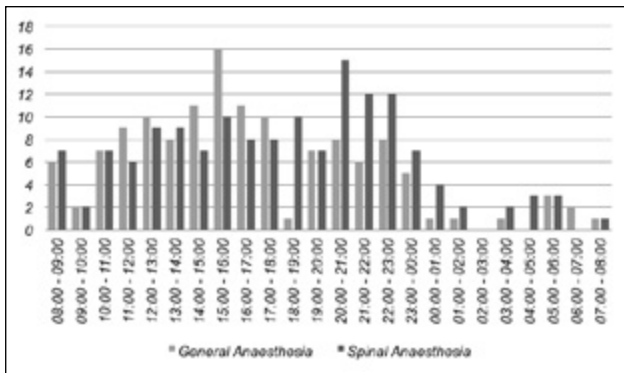


Figure 3. The distribution of anaesthesia techniques during the day

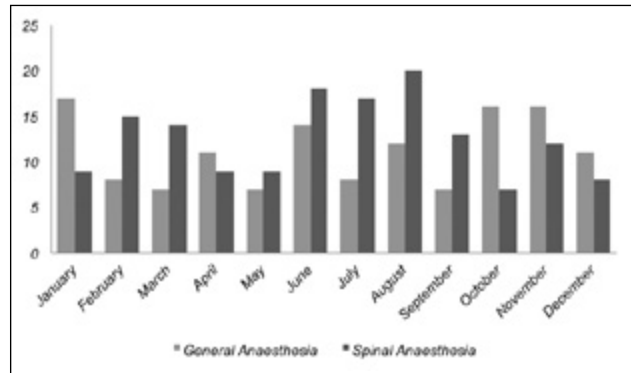


Figure 4. Monthly distribution of caesarean sections

factors such as onset time and length of delivery, along with medical decisions and convenience (10, 12). To the current knowledge, it is well described that elective induction of labour clearly results in an increased rate of operative vaginal birth or caesarean section (13, 14).

A recent study conducted by Stock et al. (13) confirmed that induction of labour was associated with a modest increase in caesarean sections. In addition, the convenience of the attending health professionals may alter the course of labour induction. These results may be adequate to determine the caesarean section peak period to be between 10:00 and 17:00.

Furthermore, the decision of urgent caesarean section may be affected by the time of day, which was demonstrated by the present study. The decline in the incidence of caesarean sections during the night shift suggested that there was an evident influence of fatigue on clinical aspects bypassing decisions to the next shifts' personnel. The outcome of this course of action was observed to be an increase in the rate of caesarean section in the morning shift.

Birth rates show seasonal differences in various populations. The pattern of absolute change of births among seasons is not unique in all populations. Most births have been observed between March and May in Northern Europe, and this rate has been shown to declines between October and November. In contrast, the birth rate increased between July and

September and decreased from March to May in the United States of America (16). A study by Basso et al. (17) concluded that summer was the most preferred season for pregnancy in Denmark, Italy and Spain. In addition, Bobak et al. (16) reported a higher birth rate in summer with a minor peak in conceptions in September. The most influential factor of birth rate is the preference of a particular date of birth. However, it may possibly be diverse in several cultures. The present study showed that caesarean sections had a tendency to increase between June and August. It was revealed that social and demographic features may play an important role in the seasonal variation in births in the studied population.

Conclusion

The present study showed that there may be a circadian rhythm in urgent caesarean sections and administration of spinal anaesthesia was the preferred technique in night shifts. It is speculated that the quality of care in night shifts is poor compared to daily working hours, which can be attributed to the possibility of physically or mentally overwhelmed or exhausted health workers making errors in clinical decisions. Therefore, it may be advantageous that decisions for clinical dilemmas should be avoided to connect the results into conclusion in the night.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Gaziosmanpaşa University Clinical Research Ethics Committee (15-KAEK-134).

Informed Consent: Due to the design of the study as retrospective analysis, informed consent was not obtained.

Peer-review: Externally peer-reviewed.

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Hasta Onamı: alıřmanın tasarımı retrospektif analiz olduđu iin, hasta onamı alınmamıřtır.

Hakem Deđerlendirmesi: Dıř bađımsız.

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