Anaesthesia Techniques for Caesarean Operations: Retrospective Analysis of Last Decade

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Objective: The technique of anaesthesia in caesarean sections is selected according to the patient's clinical presentation, experience of the anaesthetist and the patient's wishes. The purpose of this study was to evaluate the anaesthesia methods employed in our clinic in the last decade (2003-2012).

Methods: Records of caesarean operations performed between 2003-2012 in the Anaesthesia department of Atatürk University Medical Faculty and stored in the hospital computer system were examined. The annual distribution of methods of anaesthesia in operations was analysed.

Results: During 2003-2012, 9049 caesarean operations were performed in our clinic. General anaesthesia was used in 45% of operations and regional anaesthesia in 54%. Whereas the rate of regional anaesthesia in 2003 was 34%, this increased to 69% in 2012. The most commonly used method of regional anaesthesia was spinal anaesthesia (34%) in 2003, and spinal anaesthesia (41%) and combined spinal-epidural anaesthesia (27%) in 2012.

Conclusion: The most commonly used anaesthesia technique for caesarean operations in our clinic between 2003-2012 was spinal anaesthesia. The most widely used regional anaesthetic method in our clinic was spinal anaesthesia. A significant increase in the use of the combined spinal-epidural anaesthetic technique occurred in the last two years of the study period.

Key Words: Caesarean section, anaesthetic techniques, general anaesthesia, regional anaesthesia, retrospective evaluation

Introduction

The anaesthetic method used in caesarean section procedures is important for the health of the mother and the baby (1, 2). Based on the clinical and laboratory findings of the patient, the experience of the anaesthetist and the preference of the patient, the most suitable anaesthetic technique for the individual patient should be selected. Two types of anaesthetic methods are used in caesarean section surgeries; general (GA) and regional (RA) [spinal (SA), epidural (EA), combined spinal-epidural (CSEA)]. Regional anaesthesia has some advantages like faster recovery of gastrointestinal functions after surgery, better postoperative analgesia, early mobilization of the patient in the postoperative period, early communication between mother and baby and lower risk of drug toxicity for the mother and the baby (3-5). Therefore, RA techniques are preferred to be used as anaesthetic methods in caesarean section surgeries in many countries (6, 7). Preference of regional anaesthesia has also shown an increase in the last 5 years in our country (8, 9).

In this retrospective study, we aimed to evaluate the anaesthesia methods used in caesarean section surgeries in Atatürk University Medical Faculty between 2003 and 2012, and to identify the differences in anaesthetic techniques over the years.

Methods

Ethics committee approval was obtained from the Ethics committee of Atatürk University Medical Faculty (Date: 04.06.2013, number: B.30.2.ATA.0.01.00/90) before the initiation of the study. In this retrospective study, the computerized hospital anaesthesia records of 9049 patients who had undergone caesarean sections in the operating theatres of Atatürk University Medical Faculty Hospital between 2003 and 2012 were reviewed after obtaining informed consents from the patients. The

annual distribution of anaesthetic methods used in surgeries was determined. Anaesthesia methods were recorded as GA and RA, and RA was classified into SA, EA and CSEA subgroups. Additionally, data were classified into two groups, and the anaesthetic techniques used between 2003 and 2007 and those used between 2008 and 2012 were compared.

Statistical analysis

Statistical Package for the Social Sciences (SPSS) version 13.0 (Chicago IL.) was used in the statistical analysis of study data. Kolmogorov-Smirnov test was used to determine whether the data showed normal distribution or not. Descriptive statistics were presented as patient number and percentages (%) for nominal variables. The mean total and percentage of data were calculated, and chi-square test was used for analysis. A p value <0.05 was considered to be statistically significant.

Results

A total of 9049 caesarean sections were performed in our clinic between 2003 and 2012; 45%, 45%, 6.6% and 2.8% of the patients had received SA, GA, CSEA and EA, respectively (Table 1). The annual distribution of anaesthetic techniques used in caesarean section surgeries in our clinic is presented in Figure 1. It was observed that the rate of regional anaesthesia increased from 34% in 2003 to 69% in 2012 (Table 1). The most frequently used regional anaesthesia method was SA (34%) in 2003, and SA (41%) and CSEA (27%) in 2012 (Figure 1).

While there was a statistically significant decrease in the use of GA ($p<0.01$), a significant increase was observed in the rate of regional anaesthesia ($p<0.01$) in the last 5 years (Figure 2). Data of 2003 and 2012 are also presented as Figures 3 and 4.

Discussion

In this present study, it was found that the most commonly used anaesthesia method in caesarean sections in our clinic between 2003 and 2012 was RA, and the most commonly used RA technique was SA. There was a significant increase in the use of CSEA in caesarean section surgeries in our clinic in the last two years.

The use of regional anaesthetic techniques in caesarean section surgeries has increased in the recent years (9-11). Töre et al. (11) compared obstetric analgesia and anaesthesia data of 1998 with that of 2005, and investigated whether there was a difference in the anaesthesia methods over the years. They found that, compared to the methods used in 1998, regional anaesthesia, and especially SA use in caesarean section surgeries, has significantly increased in 2005. Toker and colleagues

Figure 1. Annual distribution of anaesthesia methods used in caesarean section surgeries between 2003 and 2012

Data the number of patients, statistics; *, **, †: Chi-square test, *: $p<0.01$, in comparison of 2003 and 2004 data, **: $p<0.01$, in comparison with the data of the other years, †: $p<0.01$, in comparison of 2011 and 2012 data

Table 1. Annual distribution of anaesthetic techniques used in caesarean section surgeries performed between 2003 and 2012

Year	General Anaesthesia n (%)	Spinal Anaesthesia n (%)	Combined Spinal- Epidural Anaesthesia n (%)	Epidural Anaesthesia n (%)	Total
2003	545 (65)*	285 (34)	0 (0.0) ^β	2 (0.2)	832
2004	505 (61)*	309 (37)	0 (0.0) ^β	8 (0.9)	822
2005	468 (52)*	405 (45)	1 (0.1) ^β	14 (1.5)	888
2006	481 (44)*	512 (47)	10 (0.9) ^β	73 (6.7)	1076
2007	416 (46)*	397 (44)	42 (4.6) ^β	38 (4.2)	893
2008	386 (41)*	429 (45)	65 (6.9) ^β	58 (6.1)	938
2009	308 (36)*	429 (50)	72 (8.5) ^β	33 (3.9)	842
2010	435 (42)*	503 (49)	71 (6.9) ^β	10 (0.9)	1019
2011	265 (34)	439 (55)	80 (10) ^β	6 (0.7)	790
2012	288 (30)	391 (41)	257 (27)	13 (1.3)	949
Total	4097 (45.2)	4099 (45.2)	598 (6.62)	255 (2.81)	9049

Data the number of patients (%), statistics; *, ^β: Chi-square test; *: $p<0.01$, comparison of 2011 and 2012 data, ^β: comparison with 2012 data

Figure 2. Comparison of anaesthetic methods used in caesarean section surgeries performed between 2003 and 2007 with those performed between 2008 and 2012

Data the number of patients, statistics; *: Chi-square test, *: $p < 0.01$, in comparison of 2003-2007 data

Figure 3. Distribution of caesarean section surgeries performed in 2003 according to the anaesthetic method used

Figure 4. Distribution of caesarean section surgeries performed in 2012 according to the anaesthetic method used

(9) reported that regional anaesthesia was applied in 77% of caesarean sections between 1996 and 2000 in their clinic and SA was the method used in all of them.

In our study, it was found that there was a significant increase in the use of regional anaesthesia methods in caesarean section surgeries in the last 5 years (62%). As regional anaesthetic methods do not cause respiratory depression, allow better pain control in the postoperative period, sooner

communication between the mother and the baby and early breastfeeding, mainly these methods are preferred to be used in caesarean section surgeries in our clinic (2). It was observed that the most commonly used regional anaesthesia method was SA (47%). Its more frequent use was attributed to its easier application, high success rate (failure rate 3.1%), rapid induction of surgical anaesthesia and adequate muscle relaxation, and lower risk of drug toxicity to the mother and the baby as the amount of local anaesthetic used is smaller (2, 3).

Considering the global situation, there is an increase in the use of regional anaesthesia techniques in Germany after 2002, and it has been reported that the most frequently used anaesthetic method in caesarean section surgeries is SA with a 90.8% usage rate (6). In Spain, the usage rate of regional anaesthesia in caesarean sections is 98%, and among them the usage rate of SA is 75% (12). In caesarean sections, regional anaesthesia is used at a rate of 72% in USA, 90% in Sweden, 95% in Norwegian and 90% in the United Kingdom (13, 14). The lower usage rate of regional anaesthesia in our clinic compared to other countries in the world is due to the insufficient knowledge of patients about regional anaesthesia methods. The patients refuse regional anaesthesia because of reasons such as fear of paralysis and experiencing pain during surgery.

There are various studies investigating the effects of anaesthetic technique and drug on the mother and the baby (15-18). Although SA has some superior properties such as rapid onset of action, lower use of local anaesthetics, easy application and providing adequate muscle relaxation, hypotension associated with sympathetic blockade may influence foetal oxygenation in the negative way by decreasing the uterine blood flow (2). In order to minimize the risk of hypotension, the patients are given lactated Ringers' solution (1000 cc, IV) half an hour before SA in our clinic. Colloidal solutions are used in urgent cases. We prefer to use 25 gauge spinal needle (pencil point) and hyperbaric bupivacaine (as local anaesthetic) in spinal anaesthesia.

The use of CSEA has shown an increase in the recent years worldwide, as it provides sufficient anaesthesia in prolonged surgeries, and long-term and safe pain relief after surgery (19, 20). Blanshard and colleagues (20) reported that anaesthetists used CSEA technique at a rate of 65% in caesarean sections. In a study performed in our country, it was demonstrated that CSEA provided better maternal haemodynamic stability and postoperative analgesia in comparison to spinal anaesthesia; however, it is not superior in terms of intraoperative anaesthesia quality and had similar effects on the new-born (19). In our study, we found that while CSEA technique was not used in any of the caesarean section surgeries performed in 2003 in our clinic, it was used in 27% of surgeries in 2012. CSEA is performed by needle through needle method (26 G Quincke needle) with hyperbaric bupivacaine in our clinic.

In our clinic, induction of general anaesthesia is performed with propofol and nitrous oxide-oxygen combination at low concentrations until delivery, and anaesthesia is maintained with normal concentrations of inhalation anaesthetics. GA use in caesarean section surgeries is gradually decreasing all over the world as difficult intubations are more frequently encountered in pregnant women than the other patient groups, aspiration risk, negative effects of the anaesthetic drugs on the new-born by placental transfer, delayed communication between mother and baby and greater postoperative pain and nausea and vomiting (3). Kocamanoglu and colleagues (21), in their study where they evaluated the anaesthetic methods used in caesarean sections between 1997 and 2002 in their clinic, found that GA use was higher than the total of all regional anaesthesia applications, but there was a significant trend of increase for regional anaesthesia methods over the years; they determined that while the rate of regional anaesthesia practices in caesarean sections was 3% in 1997, it reached to 30% in 2002 and the mostly used regional anaesthesia method was spinal anaesthesia. Similar to that study, while the rate of regional anaesthesia in caesarean section surgeries was 34 in % 2003 in our clinic, the rate increased to 69% in 2012 and the most frequently used regional anaesthesia method was spinal anaesthesia.

The synergy and communication level between the anaesthetist and the gynaecology specialist is important in the selection of anaesthesia technique for caesarean section surgeries (22). Kocamanoglu and colleagues (21) in their questionnaire study on anaesthesia preferences in caesarean section surgeries reported that anaesthetists mostly preferred regional anaesthesia for their close relatives and patients, while gynaecology specialists preferred regional anaesthesia methods for close relatives, and general anaesthesia methods for their patients. Gynaecology specialists justified their choice by noting that regional anaesthesia does not provide adequate muscle relaxation in the surgical site, the patient cannot be placed in Trendelenburg position and surgery duration is prolonged. Whereas a recent study (23) reported that, contrary to the general opinion of surgical teams; spinal anaesthesia use in elective caesarean sections does not prolong operating room use and does not make any difference regarding the new-born. These studies reveal the importance of information exchange between the gynaecology specialist and the anaesthetist, and education on obstetric anaesthesia practice in the selection of the most suitable anaesthesia method for the individual patient.

The concomitant evaluation of anaesthetic techniques used in urgent and elective caesarean sections is a limitation of the study. However, as mostly regional anaesthesia is preferred for both conditions in our clinic, we think that this limitation had no effect on the study results.

Conclusion

It can be said that the mostly used anaesthetic method used in caesarean section cases in our clinic is regional anaesthesia.

The increase in the use of regional anaesthesia methods in the recent years is significant; however although this increase is similar to the mean increase in Turkey, the figures are lower in comparison to developed countries. While the mostly preferred regional anaesthesia method is SA in our clinic, there has been a significant increase in the use of CSEA technique especially in the last two years.

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Informed Consent: Written informed consent was obtained from patients who participated in this study.

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