Acta Clin Croat 2022; 61:581-587
doi: 10.20471/acc.2022.61.04.03

Original Scientific Paper

LEVEL OF PAIN AND ANALGESICS TAKEN AFTER CESAREAN SECTION AND DIFFERENCES ACCORDING TO TYPE OF ANESTHESIA AND DEMOGRAPHIC FACTORS

Igor Andrić, Dajana Vladić-Spaić, Zoran Karlović, Ana Milas, Boris Matić, Slavica Šimić and Mirko Mihalj

Mostar University Hospital, Department of Anesthesia, Resuscitation and Intensive Care, Mostar, Bosnia and Herzegovina

SUMMARY – The aim of this study was to investigate the level of pain and analgesic consumption in puerperas after cesarean section according to the type of anesthesia administered. This was a prospective study conducted at the Department of Obstetrics and Gynecology, Mostar University Hospital, in the period from September 2015 to June 2016. The study included 111 puerperas. Experimental group included 54 puerperas operated on under spinal anesthesia, while comparative group included 57 puerperas operated on under general anesthesia. Primary endpoints of the study were pain score and dose number of analgesics used. Input parameters of the study were age, gestational age, education, and place of residence. To determine the level of pain, visual analog scale for pain was used. Results showed that puerperas operated on under spinal anesthesia had significantly lower pain sensation (p=0.031) and less need for analgesic consumption in the postoperative period as compared to those operated on under general anesthesia (p=0.024). Increased age was associated with lower pain sensation (p=0.014) and need for analgesics (p<0.05). Higher level of education was associated with greater need for analgesics (p=0.016). Living in urban area was associated with greater pain sensation (p=0.023) and less need for analgesics (p<0.17). Spinal anesthesia for cesarean section resulted in less pain and less need for analgesics in the postoperative period compared to general anesthesia.

Key words: *Puerpera; Spinal anesthesia; General anesthesia; Pain level; Analgesic consumption; Cesarean section*

Introduction

Pain is an important health problem everywhere in the world, especially chronic pain that contributes to large-scale disability. Pain is considered as the fifth vital sign. Acute pain, chronic non-aligning pain, and pain caused by malignant disease can be distinguished. Pain is always subjective and also serves as a protective mechanism of the body. Further, pain is one of the most common reasons why patients search for medical help. Pain has significant impact on the quality of life and therefore it is very important to detect the causes of pain, pathways of painful stimulation, pathophysiological events in the body, and the ways of treating pain. Chronic pain increases health care costs, it is the reason for the loss of personal income, incapacity for work, and other problems.

Pregnancy is a physiological condition and a great event for every woman. Most women experience preg-

Correspondence to: *Dajana Vladić-Spaić, MD,* Splitska 20, Mostar, Bosnia and Herzegovina
E-mail: daki.vladic@hotmail.com

Received December 3, 2019, accepted November 5, 2020

nancy as something positive and as a form of self-fulfillment. Pregnancy brings new insights in women. During pregnancy, the overall hormonal status in woman's body changes in terms of elevated levels of estrogen, pituitary hormone, and thyroid hormone, all of which affect the occurrence of certain psychological disorders[1-3].

Every fifth child is born by cesarean section. Two-thirds of such childbirths happen unexpectedly. Cesarean section can be as comfortable as vaginal childbirth. The rate of cesarean section in European countries in 2000 ranged from 13% to 15%[4], whereas in the USA it was 30% in the last decade[4,5]. In Bosnia and Herzegovina, the rate of cesarean section in the 2008-2012 period was 13.9%[6]. In recent years, the rate of cesarean section in tertiary centers including Department of Obstetrics and Gynecology, Mostar University Hospital, is convincingly over 20%[7].

The purpose of this clinical trial was to investigate the level of pain and consumption of analgesics after cesarean section according to the type of anesthesia administered.

Methods

A prospective study was conducted at the Department of Obstetrics and Gynecology, Mostar University Hospital, in the period from September 1, 2015 to June 30, 2016. The study included 111 puerperas with cesarean section who had not undergone the same procedure before. Experimental group consisted of 54 puerperas operated on under spinal anesthesia, while comparative group consisted of 57 puerperas operated on under general anesthesia.

Output parameters of the study were pain and number of analgesics received in the postoperative period. Input parameters of the research were age, gestational age, level of education, and place of residence. The visual analog scale (VAS) for pain was used to determine the level of pain. VAS for pain is a standard tool for pain assessment in all patients with chronic painful conditions of the locomotor system[8]. The respondents are asked to mark the site corresponding to their severity of pain on a 10-centimeter long line, after which the VAS sum is apparent on the other side of the millimeter scale. According to the scale, 0 means that there is no pain and 10 means the strongest pain. If VAS is 0-3, pain level does not require analgesic therapy. Respondents from both groups filled out the VAS on day 1, day 3 and day 6 of the cesarean section.

The number of analgesics used was measured from day 1 to day 6 of the cesarean section. It was explained to the respondents that the data obtained would be fully protected and used exclusively for the purpose of the research. All respondents agreed to participate in the study, which they confirmed by signing the informed consent form.

The data collected were statistically processed using the descriptive statistics method (arithmetic mean, M, standard deviation, SD). Correlation between variables was tested by standard correlation tests (Spearman's correlation test and Kendall tau). The difference between the groups and between nominal variables was checked by the χ^2-test for two independent samples. The difference between the groups for numeric variables was tested by using t-test. The level of statistical significance was set at $p<0.05$.

Statistical analysis of the data obtained was performed by the Statistical Package for the Social Sciences, version 13.0 (SPSS Inc., Chicago, Illinois, USA). Patient data were collected into Microsoft Excel table (version of Office 2007, Microsoft Corporation, Redmond, WA, USA).

Results

The study included 111 puerperas. Comparison of the sociodemographic features of the study groups did not show statistically significant differences (Table 1). Table 2 shows differences in the sensation of pain between the study groups. The mean values of self-assessment of pain sensations measured by the VAS scale in the postoperative period differed significantly between the groups (p=0.03).

Analyzing correlation between the sensation of pain and the observed characteristics of the experimental group respondents, statistically significant negative correlation between age and pain level was noticed (p=0.014). Significant correlation was noticed between the place of residence and level of pain sensation (p=0.021). Correlation between the level of education and level of pain sensation was significant (p=0.054), while no correlation was found between gestational age and level of pain sensation (Table 3). Analyzing the correlation of the same parameters in the comparative group, statistically significant nega-

Table 1. Sociodemographic characteristics of respondents (N=111)

Characteristic	Experimental group (n=54)		Comparative group (n=57)		t-test	p
	M	SD	M	SD		
Age	24.8	3.5	26.1	4.4	1.739	0.186
Gestational age	40.2	1.8	40.5	1.6	1.062	0.487
Level of education:	n	%	n	%	χ^2	P
High school	38	70.3	40	70.1	0.189	0.874
University	16	29.7	17	29.9		
Place of residence:						
Urban	36	66.6	39	68.4	0.201	0.843
Rural	18	33.4	18	31.6		

M = arithmetic mean; SD = standard deviation

Table 2. Differences in the sensation of pain between the groups

VAS	Experimental group (n=54)		Comparative group (n=57)		t-test	p
	M	SD	M	SD		
	4.08	1.1	4.69	1.4	2.527	**0.031**

M = arithmetic mean; SD = standard deviation; VAS = visual analog scale

Table 3. Correlation of observed characteristics and level of pain sensation in the experimental group

Characteristic	Level of pain sensation according to VAS	
	Spearman's rho	p
Age	-0.305	**0.014**
Gestational age	0.036	0.631
Level of education	0.237	0.054
Place of residence	0.256	**0.021**

VAS = visual analog scale

Table 4. Correlation of observed characteristics and level of pain sensation in the comparative group

Characteristic	Level of pain sensation according to VAS	
	Spearman's rho	p
Age	-0.214	**0.033**
Gestational age	0.023	0.794
Level of education	0.153	0.483
Place of residence	0.241	**0.023**

VAS = visual analog scale

Table 5. Use of analgesics in the postoperative period in the experimental and comparative groups

Number of analgesics used	Experimental group (n=54)		Comparative group (n=57)		t-test	p
	M	SD	M	SD		
	5.12	1.3	5.87	1.8	2.704	**0.024**

M = arithmetic mean; SD = standard deviation

Table 6. Correlation of observed characteristics and number of analgesics used in the experimental group

Characteristic	Number of analgesics used	
	Spearman's rho	p
Age	-0.865	**<0.05**
Gestational age	0.096	0.483
Level of education	0.301	0.016
Place of residence	0.284	**0.017**

Table 7. Correlation of observed characteristics and number of analgesics used in the comparative group

Characteristic	Number of analgesics used	
	Spearman's rho	p
Age	-0.723	**<0.05**
Gestational age	0.132	0.418
Level of education	0.323	0.012
Place of residence	0.284	**0.017**

tive correlation between age and level of pain sensation (p=0.033) was noticed, as well as between the place of residence and level of pain sensation (p=0.023) (Table 4). There was no correlation between gestational age and level of education in relation to the level of pain sensation.

Table 5 shows the use of analgesics in the postoperative period. Respondents in the comparative group received a significantly higher number of analgesics in the postoperative period (p=0.024) compared to respondents in the experimental group. Significant negative correlation between age and number of analgesics was noticed (p<0.05), as well as between education (p=0.016) and place of residence (p=0.017) in relation to the number of analgesics received. There was no correlation between gestational age and number of analgesics received (Table 6).

Comparison of the same parameters in the comparative group showed negative correlation between age and number of analgesics used (p<0.05), as well as between the level of education (p=0.012) and place of residence (p=0.017) according to the number of analgesics used. There was no correlation between gestational age and level of pain sensation (Table 7).

Discussion

The number of cesarean deliveries is steadily increasing and it is one of the most frequent operations around the world. In the last ten years, the number of births completed by cesarean section has increased twice and further growth is expected[4-6]. Similar results were shown in one research that was conducted in our country[7]. In some countries, even half of women deliver by cesarean section.

Our survey included 111 respondents. We analyzed the type of anesthesia applied during cesarean section, age parameters, education, place of residence of the respondent, level of pain sensation, and use of analgesics in the postoperative period. Numerous previous studies have confirmed the benefits of spinal anesthesia for cesarean section in comparison to general anesthesia. The results of these studies indicate greater safety for mother and child, lower likelihood of complications, less blood loss, and better mother and baby survival[10-16]. However, recent developments in pain treatment are more commonly investigated for the occurrence of chronic pain. The results of these studies indicate that there is a significant rate of chronic pain after cesarean section (11.5%). Considering the subject of this study, it is important to note that numerous studies have shown lower incidence of chronic pain in patients with spinal anesthesia, as well as in patients who had appropriate treatment (VAS <4) for pain in the early postoperative period[17,18].

Results of some studies indicate lower strength and better control of postoperative pain in patients operated on under spinal anesthesia, as confirmed in our study[19]. However, results of other studies suggest that both types of anesthesia are comparable and without significant overall differences in treatment and control of postoperative pain[20]. Spinal anesthesia is a good choice for cesarean section due to minimal uteroplacental drug flow and with negligible local anesthetic toxicity, and has advantage over general anesthesia for avoiding the risk of difficult airway, allergic reactions, etc. After introducing atraumatic pencil-point small diameter needles, spinal anesthesia has become the best option for anesthesia during cesarean section because it provides a fast, reliable and deep surgical block by simply initiating a small dose of local anesthetic in an easily accessible manner[21].

The most common side effects of spinal anesthesia are hypotension and postdural puncture headaches[22]. Brkić Gudelj *et al.* in their work did not demonstrate a difference in arterial pressure during spinal and general anesthesia in case of cesarean section in women with preeclampsia but they rather noticed greater use of ephedrine in spinal anesthesia compared to general anesthesia (13.7 mg *vs*. 2.7 mg)[23].

Another side effect that is related to spinal anesthesia is postdural puncture headache and blood patch that is performed 24 hours after cesarean section if conservative methods have not helped reduce pain[22]. Kotorac *et al*. report on a 4.54% rate of using blood patch in the first 6 months of 2011 at Sveti Duh University Hospital in Zagreb[11]. L'ubuský *et al.* in their extensive meta-analysis state that the rate of postdural puncture headaches in 2003 was 16.6%, while the rate of blood patch was 12.9%[10]. However, in 2004, at the same hospital, the rate of postdural puncture headaches was 8.3%, and in none of the cases was a blood patch administered[24]. During our study, we did not notice the occurrence of hypotension. However, we noted the occurrence of postdural puncture headaches. Specifically, postoperative headaches had been reported in 10 puerperas after cesarean section in spinal anesthesia. Since the mentioned puerperas did not follow the instructions (insufficient fluid intake, early get up, etc.), we did not enter these data into the results of this study. We did not include side effects of general anesthesia in data processing either. It is important to emphasize that there were no serious side effects (transient or permanent) during or after cesarean section.

We also explored demographic and socioeconomic factors that affect the experience and strength of pain. Previous similar researches did not give clear conclusions on the impact of the place of residence or level of education on the experience and strength of pain[25]. We studied two levels of education, high school and level VI (master degree). This observation clearly indicates that the level of education is one of the indicators for the appearance and strength of early postoperative pain. Also, the place of residence (rural or urban area) as a predictor of early postoperative pain is more cited in the area of chronic pain research. We proved that there was a significant influence of the place of residence, indicating that cultural influence is important in pain experience, which is often mentioned in the literature, but there are no consistent research results[26-29]. Given that this research has shown that such features may have a significant impact on the occurrence of pain, it is important to emphasize the need for a more extensive research that would involve a greater number of patients with special focus on demographic, cultural, socioeconomic and individual indicators[30-32].

Conclusion

Puerperas who had cesarean section in spinal anesthesia had significantly less pain in the postoperative

period compared to puerperas operated on in general anesthesia, resulting in lower need for analgesics (p=0.031). There was a negative correlation between age and pain sensation, which means that a significantly lower pain sensation in the postoperative period was observed in older subjects (p=0.014). Puerperas from urban area had significantly higher sensation of pain in the postoperative period compared to puerperas from rural area (p=0.017). There was a negative correlation between age and need for analgesics, which means that older puerperas had a lower need for analgesics in the postoperative period (p<0.05). Puerperas with a higher level of education had a statistically significantly higher need for analgesics in the postoperative period compared to lower-grade puerperas (p=0.012). Puerperas from urban areas had a statistically significant need for postoperative analgesics as compared to puerperas from rural areas (p=0.017).

References

1. Šurbatović M, Vesić Z, Djordjević D, Radaković S, Zeba S, Jovanović D, *et al*. Efekti mehaničke ventilacije kontrolisane pritiskom kod osoba sa oštećenjem respiratorne funkcije tokom laparoskopske holecistektomije. Vojnosanit Pregl. 2013;70:9-15. DOI: 10.2298/VSP1301009S. (in Serbian)
2. Vulinik NC, Denys D, Bus L, Westenberg HG. Female hormones affect symptom severity in obsessive-compulsive disorder. Int Clin Psychopharmacol. 2000;21(3):171-5. DOI: 10.1097/01.yic.0000199454.62423.99.
3. Mancuso RA, Schetter CD, Rini CM, Roesch SC, Hobel CJ. Maternal prenatal anxiety and corticotrophin-releasing hormone associated with timing of delivery. Psychosom Med. 2004;66(5):485-92. DOI: 10.1097/01.psy.0000138284.70670.d5.
4. Pop VJ, Wijnen HA, Lapkienne L, Bunivicius R. Vader HL, Essed GG. The relation between gestational thyroid parameters and depression: a reflection of the downregulation of the immune system during pregnancy? Thyroid. 2006;16(5):485-92. DOI: 10.1089/thy.2006.16.485.
5. Klein M, Waldhör T, Vutuc C, Beck A. Frequency of cesarean sections in Austria. Gynakol Geburtshilfliche Rundsch. 2000;40(3-4):125-9. DOI: 10.1159/000053013
6. Potkonjak AM, Djaković I, Sabolović Rudman S, Poljak L, Košec V. Risk assessment in pregnancy among women aged over forty. Acta Clin Croat. 2021;60:290-5. DOI: 10.20471/acc.2021.60.02.16
7. Martin JA, Hamilton BE, Osterman MJ. Births in the United States, 2014. NCHS Data Brief. 2015;(216):1-8.
8. Statistics-Bosnia and Herzegovina. 2013. [Internet] [accessed Sep 25, 2016]. Available at: http://www.unicef.org./infobycountry/bosniaherzegovina _ statistics.html
9. Stark M. Misgav-Ladach method for cesarean section: detailed description of surgical methods. Obstetrics, Gynecology and Neonatology (Armenia). 2014;8:56-60.
10. L'ubuský M, Berta E, Procházka M, Marek O, Kudela M. Development of incidence of post-dural puncture headache in patients undergoing caesarean section in spinal anaesthesia at the Department of Obstetrics and Gynecology in Olomouc during 2003-2004. Cas Lek Cesk. 2006;145(3):204-8.
11. Kotorac K, Brozović G, Šakić K. Neželjene pojave spinalne anestezije nakon carskog reza. Gynaecol Perinatol. 2013;25(4):178. (in Croatian)
12. Alan JR. Randomized controlled trial of combined spinal epidural *vs*. spinal anaesthesia for elective caesarean section: vasopressor requirements and cardiovascular changes. Eur J Anaesthesiol. 2009;26:47-51. DOI: 10.1097/EJA.0b013e328319c153
13. Beye MD, Ka-Sall B, Diouf E, *et al*. Spinal anaesthesia for cesarean section: rate and management of complications in 110 Senegalese parturients. Dakar Med. 2002;47(2):244-6.
14. Jellish W. Anesthetic issues and perioperative blood pressure management in patients who have cerebrovascular diseases undergoing surgical procedures. Neurol Clin. 2006;24(4):647-59. DOI: 10.1016/j.ncl.2006.06.008.
15. Baraka A. Anaesthesia and myasthenia gravis. Can J Anaesth. 1992;39(5):476-86. DOI: 10.1007/BF03008713
16. Dorotta I, Schubert A. Multiple sclerosis and anesthetic implications. Curr Opin Anaesthesiol. 2002;15(3):365-70. DOI: 10.1097/00001503-200206000-00015
17. Holte K, Keffiet H. Epidural analgesia and the surgical stress response implications for postoperative nutrition. Clin Nutr. 2002;21:199-206. DOI: 10.1054/clnu.2001.0514
18. Chattopadhyay S, Das A, Pahari S. Fetomaternal outcome in severe preeclamptic women undergoing emergency cesarean section under either general or spinal anesthesia. J Pregnancy. 2014;2014:325098. DOI: 10.1155/2014/325098.
19. Bouhassira D, Attal N, Alchaar H, Boureau F, Brochet B, Bruxelle J, *et al*. Comparison of pain syndromes associated with nervous or somatic lesions and development of a new neuropathic pain diagnostic questionnaire (DN4). Pain. 2005;114(1:2):29-36. DOI: 10.1016/j.pain.2004.12.010
20. Weibel S, Neubert K, Jelting Y, Meissner W, Wöckel A, Roewer N, Kranke P. Incidence and severity of chronic pain after caesarean section: a systematic review with meta-analysis. Eur J Anaesthesiol. 2016 Sep 14. [Epub ahead of print]. DOI: 10.1097/EJA.0000000000000535
21. Nesek-Adam V, Rasić Z, Schwarz D, Grizelj-Stojičić E, Rasić D, *et al*. Spinal *versus* general anesthesia on postoperative pain and analgesic requirements in patients undergoing peripheral-vascular surgery. Coll Antropol. 2012;36(4):1301-5.
22. Swinkels-Meewisse IEJ, Roelofs J, Oostendorp RAB, Verbeek ALM, Vlaeyen JWS. Acute low back pain: pain-related fear and pain catastrophizing influence physical performance and perceived disability. Pain. 2006;120:36-43. DOI: 10.1016/j.pain.2005.10.005
23. Brkić Gudelj I, Šklebar I, Habek D. Ten-year follow-up of quality in regional anesthesia and analgesia in obstetric regional anesthesia: improving quality. Acta Clin Croat (Suppl 2) 2022;61:41-8.
24. Mancuso A, De Vivo A, Giacobbe A, Priola V, Maggio Savasta L, Guzzo M, De Vivo D, Mancuso AJ. General *versus* spinal anaesthesia for elective caesarean sections: effects on neo-

natal short-term outcome. A prospective randomised study. Matern Fetal Neonatal Med. 2010 Oct;23(10):1114-8. DOI: 10.3109/14767050903572158

25. Filipović R. Epiduralna analgezija i spinalna analgezija kod normalnog poroda i carskog reza. Bilten Ljekarske. 2011;1(14):6. (in Croatian)
26. Kessous R, Weintraub AY, Wiznitzer A, Zlotnik A, Pariente G, Polachek H, *et al*. Spinal *versus* general anesthesia in cesarean sections: the effects on postoperative pain perception. Arc Gynecol Obstet. 2012;286(1):75-9. DOI: 10.1007/s00404-012-2265-y
27. Wing DA, Lovett K, Paul RH. Disruption of prior uterine incision following misprostol for labor induction in women with previous cesarean delivery. Obstet Gynaecol. 1998;91:828-30. DOI: 10.1016/s0029-7844(97)00553-x
28. Caughey AB, Shipp TD, Repke JT, *et al*. Rate of uterine rupture during a trial of labor in women with one or two prior cesarean deliveries. Am J Obstet Gynecol. 1999;181:872-6. DOI: 10.1016/s0002-9378(99)70317-0
29. Chapman SJ, Owen J, Hauth JC. One- *versus* two-layer closure of a low transverse cesarean: the next pregnancy. Obstet Gynecol. 1997;89:16-22. DOI: 10.1016/s0029-7844(97)84257-3
30. Eskew PN Jr, Saywell RM Jr, Zollinger TW, Erner BK, Oser TL. Trends in the frequency of cesarean delivery: a 21-year experience, 1970-1990. J Reprod Med. 1994;39:809-17.
31. Kasum M. Carski rez. In: Kuvačić I, Kurjak A, Đelmiš J, *et al*., editors. Porodništvo. Zagreb: Medicinska naklada, 2009. (in Croatian)
32. Lončarić-Katušin M, Persoli-Gudelj M, Šimić-Korać N, Blažanin B, Žunić J, Korać Z. Acute postoperative pain therapy: current state – patient experience. Acta Clin Croat. 2006;45:15-9.

Sažetak

RAZINA BOLI I POTROŠNJA ANALGETIKA NAKON CARSKOG REZA OVISNO O VRSTI ANESTEZIJE I DEMOGRAFSKIM PODATCIMA

I. Andrić, D. Vladić-Spaić, Z. Karlović, A. Milas, B. Matić, S. Šimić i *M. Mihalj*

Cilj istraživanja je bio utvrditi razinu boli i potrošnju analgetika u babinjača nakon carskog reza u odnosu na vrstu primijenjene anestezije. Provedeno je prospektivno istraživanje u Klinici za ginekologiju i porodništvo Sveučilišne kliničke bolnice Mostar u razdoblju od 1. rujna 2015. do 30. lipnja 2016. godine. Eksperimentalna skupina sastojala se od 54 babinjače koje su operirane u spinalnoj anesteziji, dok se usporedna skupina sastojala od 57 babinjača koje su operirane u općoj anesteziji. Izlazni parametri istraživanja bili su osjećaj boli i broj doza primljenih analgetika. Ulazni parametri istraživanja bili su: životna dob, gestacijska dob, stupanj obrazovanja i sredina življenja. Za utvrđivanje razine boli primijenjena je vizualno-analogna ljestvica boli. Rezultati ukazuju na to da babinjače operirane u spinalnoj anesteziji imaju značajno manji osjećaj boli (p=0,031) i manju potrebu za analgeticima u poslijeoperacijskom razdoblju u odnosu na babinjače operirane u općoj anesteziji (p=0,024). Veća životna dob ispitanica povezana je s manjim osjećajem boli (p=0,014) i manjom potrebom za analgeticima (p<0,05). Viši stupanj obrazovanja povezan je s većom razinom boli i potrebom za analgeticima (p=0,016). Život u urbanoj sredini povezan je s većim osjećajem boli (p=0,023) i većom potrebom za analgeticima (p<0,17). Spinalna anestezija za carski rez rezultira manjim osjećajem boli i manjom potrebom za analgeticima u poslijeoperacijskom razdoblju u odnosu na opću anesteziju.

Ključne riječi: *Babinjače; Spinalna anestezija; Opća anestezija; Razina boli; Potrošnja analgetika; Carski rez*