Original Article

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Shoulder Tip Pain After Cesarean Section

Obstetrics and Gynaecology Section

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ABSTRACT

Aim: The aim of this study was to investigate the frequency of postoperative shoulder tip pain (STP) after cesarean section and compare spinal and general anaesthesia with respect to STP.

Materials and Methods: Three hundred patients who underwent cesarean section were randomly assigned to either spinal anaesthesia group (Group SA, n=143) or general anaesthesia group (Group GA, n=157). Postoperative STP was assessed at 8 hours and 24 hours after operation by Visual Analogue Scale of Pain (VAS).

Results: There were no statistically significant difference between the groups in terms of demographic data, operative findings, and clinical outcomes. The overall incidence of STP in study population was 35.7%. The incidence of STP in group SA (26.6%) was lower than that in group GA (43.9%)(p=0.005). Moreover VAS scores for STP at 6 hours and 24 hours were significantly lower in Group SA (p=0.001 and p<0.001, respectively).

Conclusion: Shoulder tip pain is a common complaint after cesarean section, which is more prevalent in general anaesthesia.

Keywords: General anaesthesia, Spinal anaesthesia

INTRODUCTION

Cesarean section is the most common surgery among women all over the world [1]. Anaesthesia type for the operation of cesarean section depends on many factors such as indications of surgery, immediate surgery treatment and the patient's will. Comparing the general anaesthesia to regional anaesthesia in the cesarean section, there are higher morbidity and mortality rates in General anaesthesia. Because of that spinal anaesthesia has recently become the preferred anaesthesia for cesarean section [2]. The advantages of regional anaesthesia include an awake mother at delivery, minimal side effect of the newborn and minimise or avoidance of the risks (aspiration, difficult intubation etc...) of general anaesthesia [3].

Shoulder tip pain (STP) usually seen after laparoscopic surgery and has been reported in more than 60% cases [4-6]. However, recent studies suggest that this type of pain is also seen after cesarean section [7,8]. Although several causes of STP following surgery have been suggested, which include the effect of CO_2 pneumoperitoneum, peritoneal stretching and diaphragmatic irritation, the precise mechanism of STP remains unclear [9-11]. Until now there are few studies investigating this condition in patients undergoing cesarean delivery. In one study it was reported that the incidence of STP after cesarean section is significant [7]. In this study, we aimed to evaluate the localization of shoulder tip pain and its incidence in patients that undergoing cesarean delivery with spinal or general anaesthesia.

MATERIALS AND METHODS

This prospective randomized double-blind clinical trial study was conducted in the evket Yılmaz Training and Research Hospital, Bursa, Turkey, during the period of September 2013 to December 2013. The trial protocol was approved by the institutional ethical committee, and written informed consent was obtained from all patients. Patients were invited to participate if they were age > 18 years and presented with an indication for an elective cesarean section at ≥ 37 weeks of gestation. Patients with suspected abnormal placentation, previous vertical uterine incision, a history of >1 cesarean section, a history of major abdominal surgery were excluded. Women who had a history of STP or any chronic pain syndrome before the operation were also excluded from this study.

From September 2013 to December 2013, a total of 320 women participated in this study. The patients were randomized blindly into two groups based on computer-generated numbers. Of these patients, 20 were excluded from the final analysis: fourteen patients were discharged within the first post-operative day; incidental adnexal masses were removed in 4 cases; intraoperative complications (bladder injury and excessive bleeding) occurred in 2 patients. Finally the study was consisted of 300 patients: 157 patients received general anaesthesia (Group GA), and 143 patients received spinal anaesthesia (Group SA).

There was no premedication given to the patients. IV line was preparated to all patients then 500 cc lactated ringer solution was infused. Pulse rate, blood pressure, SpO_2 of each parturient and fetal heart rate were recorded before anaesthesia. We administered i.v. propofol 2-3 mg/kg for induction of general anaesthesia, along with rocuronium bromide 0.9 mg/kg for facilitating rapid tracheal intubation. Cricoid pressure was applied to prevent regurgitation and aspiration of gastric content. A mixture of 50% oxygen and 50% air was given. After umbilical cord clamping, fentanyl 2 µg/kg was injected and anaesthesia was maintained using a mixture of 50% oxygen and 50% nitrous oxide and 0.5 MAC (minimum alveolar concentration) sevoflurane. At the end of the surgery, neuromuscular blockade was reversed with 2 mg/kg sugammadex and extubation was performed when the patient was fully awake. The spinal anaesthesia was given in a sitting position from the midline approach, intervertebral space L3-L4 or L4-L5, with a Quincke needle size 25-27 gauge, using 7.5-10 mg 0.5% hyperbaric bupivacaine plus 20-25 µgfentanyl intrathecally. The desired level of sensory block was T4-T6. If hypotension or bradycardia occurred iv ephedrine 10 mg or atropine sulphate 0.5 mg was administered respectively.

Surgeries were done by attending physicians and residents. Resident physicians as primary surgeons were assisted by attending physicians. Lower segment cesarean section was performed in

all the cases with low transverse skin incision, and uterus was repaired in one layer with no 1.0-vicryl sutures. Visceral and parietal peritoneum was not repaired. Rectus sheath and skin were repaired as usual. All patients were given a single use of antibiotic prophylaxis (cefazolin, 1g). Postoperative analgesia was provided with pethidine 1.5 mg/kg administered intramuscularly in all patients. Maintenance therapy with intravenous nonsteroidal anti-inflammatory drugs (diclofenac, 75 mg every 12 hours) was offered on postoperative day 1 and day 2.

The demographic data, body mass index, operation time, preoperative and postoperative hemoglobin values, the time of passing flatus were recorded. To facilitate the double-blinding method, anaesthetist not involved in this study injected the prepared medications to the patients. Thus, the patients and the observer were blinded to groups.

STP was assessed with a 10 cm visual analogue scale ((VAS) 0-no pain to 10-most severe pain) score by obstetrician blinded to which type of treatment the patients had received. Mild pain was defined as VAS score <3, moderate pain as VAS score 3-7, and severe pain as VAS score >7. The time points for evaluation were at 8 and 24 hours after surgery. The patient was considered to have STP if the VAS score for STP >0, at any observing time point.

STATISTICAL ANALYSIS

Statistical differences between two groups in discrete and continuous variables were tested using Chi-square and Student's t-test, respectively. A p-value of <0.05 was considered significant. SPSS 16.0 (SPSS Inc, IL, USA) was used to analyse the data.

RESULTS

The demographic, surgical and clinical data are presented in [Table/Fig-1]. The patient characteristics including age, body mass index, gravidity, parity and repeat cesarean section history were similar between two groups (p>0.05) [Table/Fig-1]. There were no significant differences between the groups with respect to the duration of operation (p=0.224). Both preoperative and postoperative hemoglobin values of patients were also similar between two groups (p>0.05) [Table/Fig-1].

The prevalence of shoulder tip pain was 35.7% in this study population. The proportion of patients that complained of postoperative STP at any time during the first 24 hour after operation was lower in group SA than in group GA (p=0.005) [Table/Fig-2]. The mean intensity of postoperative STP assessed by VAS at any time was also less in group SA compared to group GA [Table/Fig-2]. The mean intensity of postoperative STP at 8 hour was 2.51 ± 2.59 in group GA and 1.57 ± 2.07 in group SA (p=0.001). The mean intensity of postoperative STP at 24 h was 2.53 ± 2.55 in group GA and 1.41 ± 2.09 in group SA (p<0.001). The most common site of STP was the right shoulder in both groups. The postoperative STP measurements of the two groups were summarized in [Table/Fig-2].

	General anesthesia (GA) n= 157	Spinal anesthesia (SA) n=143	p-value
Age, (yr)	28.9± 5.1	28.8 ±5.5	0.777
Body mass index (kg/m^2)	29.9 ± 4.7	30 ± 4.4	0.843
Primary caesarean section, n(%)	67 (42.7)	52 (36.4)	0.264
Gravidity	2.4 ± 1.4	2.5 ± 1.4	0.655
Parity	1.1 ± 1.1	1.2 ±1.1	0.357
Operative time (min)	41.3 ±9.1	42.7 ±11.4	0.224
Preoperative hemoglobin value (g/dL)	11.5 ± 1.3	11.6 ± 1.2	0.508
Postoperative hemoglobin value (g/dL)	10.5 ± 1.4	10.7 ± 1.3	0.166
Passing flatus time (h)	14.6 ±7.7	14.1 ±7.9	0.575

[Table/Fig-1]: Demographic, surgical and clinical data†
†Data were expressed as number of patients (percent) and mean ±standard deviation

BCC subtype	General anesthesia (GA) n= 157	Spinal anesthesia (SA) n=143	p-value
Postoperative STP, n (%)	69 (43.9)	38 (26.6)	0.005
Mild (VAS score <3), n	28	22	
Moderate (VAS score=3-7), n	34	14	
Severe (VAS score >7), n	7	2	
VAS scores for STP at postoperative 8 h	2.51 ±2.59	1.57 ±2.07	0.001
VAS score for STP at postoperative 24 h	2.53± 2.55	1.41± 2.09	<0.001
Location of STP, n			0.898
Right shoulder	44	22	
Left shoulder	9	5	
Bilateral	16	11	

[Table/Fig-2]: Incidence and intensity of postoperative shoulder tip pain†
VAS: Visual analogue scale
STP: Shoulder tip pain
VAS: Visual analogue scale
†Data were expressed as number of patients (percent) and mean ±standard deviation

DISCUSSION

The origin of STP after abdominal surgery is multifactorial and poorly understood. It is usually regarded as referred pain. Two nerves, the phrenic and the supraclavicular, are the branch of Brachial Plexus that produced the anatomical basis of the pain. During the laparoscopic surgery, diaphragmatic muscle and phrenic nerve could be stimulated chemically or physically by CO_2 gas [11]. Subphrenic effusion may also play a role in this type of pain [1]. The incidence and severity of STP has been documented in laparoscopic operations [4-6]. A number of studies concluded that the procedures reducing the distension and irritation of diaphragmatic muscle could reduce the postoperative STP severity after laparoscopic operations [12-16].

In this study, we found that shoulder tip pain is a common complaint after CS. It usually manifests in the right side. Although this pain is generally mild, it can lead to patient discomfort. Our results indicated that spinal anaesthesia was associated with a significant reduction in the incidence and the severity of STP. We believe that this reduction is mainly due to the position of the patient. It seems that diaphragmatic irritation with amnion fluid or blood is the most important factor for STP after cesarean section. Placing the patients in a Trendelenburg position may lead to increase irritation of the diaphragm by fluids. During and after spinal anaesthesia reverse Trendelenburg position is generally preferred to minimize the risk of high blockade in our hospital. Thus the irritation of the diaphragm is more in patients who are in natural supine position (general anaesthesia) than those who are mainly in reverse Trendelenburg position (spinal anaesthesia).

The results of our study are particularly in agreement with those of Zirak et al., who evaluated the STP after cesarean section in 200 nulliparous patients and concluded that STP was more common in the patients who underwent cesarean section with general anaesthesia [7]. The main difference of our study from this study was patient selection. As the possible mechanism of STP is not related with previous surgery or adhesion, we also include the patients with history of cesarean section. Secondly, we measured some operative findings such as duration of surgery and amount of bleeding that might play a role in the pathophysiology of STP. We found the postoperative STP incidence in patients underwent spinal anaesthesia higher than general anaesthesia. This difference may be due to the position of patients during and after the operation.

LIMITATIONS

There were several possible limitations in this study. Firstly, we did not record the position of patients during the surgery. In order to determine whether the type of anaesthesia or the position of the patient has major impact on postoperative STP, the position of patient during the cesarean section should be noted. Secondly, we did not investigate the impact of STP on postoperative recovery. A study assessing how much STP interfering with patient's performance after cesarean section could answer this question. Finally, we just performed assessment within postoperative 24 hour because most of the patients discharged at postoperative day 2. A prolonged assessment is necessary to clearly know whether STP continues after discharge.

CONCLUSION

Shoulder tip pain is a common complaint after cesarean section, which is more prevalent in general anaesthesia. Explaining this complication to patient before the cesarean surgery, it might be primary option for spinal anaesthesia in the situation of patient or surgeon's will.

REFERENCES

[1] Martin JA, Hamilton BE, Ventura SJ, et al. Final data for 2009. *Natl Vital Stat Rep*. 2011;60:1-70.

[2] Shibli KU, Russell IF. A survey of anaesthetic techniques used for caesarean section in the UK in 1997. *Int J Obstet Anaesth*. 2000;9:160-67.

[3] Gulur P, Nishimori M, Ballantyne JC. Regional anaesthesia versus general anaesthesia, morbidity and mortality. *Best Pract Res Clin Anaesthesiol*. 2006;20:249-63.

[4] Phelps P, Cakmakkaya OS, Apfel CC, Radke OC. A simple clinical maneuver to reduce laparoscopy-induced shoulder pain: a randomized controlled trial. *Obstet Gynecol*. 2008;111:1155-60.

[5] Chang SH, Lee HW, Kim HK, Kim SH, Kim DK. An evaluation of perioperative pregabalin for prevention and attenuation of postoperative shoulder pain after laparoscopic cholecystectomy. *Anaesth Analg*. 2009;109:1284-86.

[6] Shin HY, Kim SH, Lee YJ, Kim DK. The effect of mechanical ventilation tidal volume during pneumoperitoneum on shoulder pain after a laparoscopic appendectomy. *Surg Endosc*. 2010;24:2002-07.

[7] Zirak N, Soltani G, Hafizi L, Mashayekhi Z, Kashani I. Shoulder pain after caesarean section: comparison between general and spinal anaesthesia. *J Obstet Gynaecol*. 2012;32:347-49.

[8] Abedian Z, Nikpor M, Mokhber N, Ebrahimzade S, Khani S. Evaluation of relationship between delivery mode and postpartum quality of life. *Iranian J ObstetGynaecol and Infertility*. 2010;13:47-53.

[9] Kandil TS, El Hefnawy E. Shoulder pain following laparoscopic cholecystectomy: factors affecting the incidence and severity. *J LaparoendoscAdvSurg Tech A*. 2010;20:677-82.

[10] Berberoğlu M, Dilek ON, Ercan F, Kati I, Ozmen M. The effect of CO2 insufflation rate on the postlaparoscopic shoulder pain. *J Laparoendosc Adv Surg Tech A*. 1998;8:273-77.

[11] Jackson SA, Laurence AS, Hill JC. Does post-laparoscopy pain relate to residual carbon dioxide? *Anaesthesia*. 1996;51:485-87.

[12] Dixon JB, Reuben Y, Halket C, O'Brien PE. Shoulder pain is a common problem following laparoscopic adjustable gastric band surgery. *Obes Surg*. 2005;15:1111-17.

[13] Sarli L, Costi R, Sansebastiano G, Trivelli M, Roncoroni L. Prospective randomized trial of low-pressure pneumoperitoneum for reduction of shoulder tip pain following laparoscopy. *Br J Surg*. 2000;87:1161-65.

[14] Jorgensen JO, Gillies RB, Hunt DR, Caplehorn JR, Lumley T. A simple and effective way to reduce postoperative pain after laparoscopic cholecystectomy. *Aust N Z J Surg*. 1995;65:466-69.

[15] Barczyński M, Herman RM. Low-pressure pneumoperitoneum combined with intraperitoneal saline washout for reduction of pain after laparoscopic cholecystectomy: a prospective randomized study. *Surg Endosc*. 2004;18:1368-73.

[16] Esmat ME, Elsebae MM, Nasr MM, Elsebaie SB. Combined low pressure pneumoperitoneum and intraperitoneal infusion of normal saline for reducing shoulder tip pain following laparoscopic cholecystectomy. *World J Surg*. 2006;30:1969-73.

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