

Case Series

Right Sided Stellate Ganglion Block before Pneumoperitoneum in Laparoscopic Surgeries. Does it Balance Hemodynamics? A Case Series

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Received: 28-Nov-2021

Revised: 26-Dec-2021

Accepted: 31-Dec-2021

Published: 01-Mar-2022

ABSTRACT

The laparoscopic technique is currently used for many types of surgery because it is painless, has less nociceptive stimulus from the skin and tissues, has fewer wound complications, and allows for a faster and smoother postoperative recovery. Institution of capnoperitoneum to visualize the viscera inside is the need in these cases. However, capnoperitoneum can cause many side effects including a significant rise in heart rate and blood pressure. Stellate ganglion block (SGB) is a sympathetic block for the head, neck, chest, and upper limbs. Hence, we hypothesized that blocking the same, especially right-sided, will decrease a sympathetic surge after capnoperitoneum. We conducted three such cases with administration of ultrasound-guided SGB in the right side 10 min before capnoperitoneum and found that there was no surge in hemodynamics. We postulate that right-sided SGB can be added to the armamentarium of countless techniques to blunt the response. We admit that this is a very small primitive report with only three cases. As ultrasound was used in all the cases, the deposition of local anesthetic drug was precise.

KEYWORDS: *Anesthesia, block stellate ganglion, blood pressure, laparoscopy, pneumoperitoneum*

INTRODUCTION

Laparoscopic technique is the most common form of minimally invasive surgery. The technique reduces pain in the perioperative period because of reduced skin and muscle nociception. Recovery occurs sooner and the hospital days are reduced, which proves that the outcomes are better.^[1] The hallmark of laparoscopy is the creation of pneumoperitoneum with pressurized carbon dioxide (CO₂). The accompanying hypercarbia and acidosis may decrease the cardiac contractility and make the myocardium more sensitive to catecholamines with added peripheral vasodilatation. The sympathetic activation caused by hypercarbia leads to tachycardia and hypertension.^[2] The most common method to treat hemodynamic stress response is to increase the depth of anesthesia. The recovery issues and the myocardial suppression by certain inhalational agents make us to think about better alternatives. Esmolol, an ultrashort-acting β₁-selective adrenoceptor antagonist, has successfully been used during laparoscopic cholecystectomy to prevent

the pressor response to induction and maintenance of CO₂ pneumoperitoneum. Clonidine, an α₂-agonist, has also been useful during laparoscopic cholecystectomy in the prevention of hemodynamic stress response.^[3,4] Rapid recovery from anesthesia and low hypnotic potency are characteristics of a new short-acting opioid, remifentanyl. Remifentanyl, as a continuous infusion, might facilitate a smooth hemodynamic course as well as a rapid emergence from laparoscopic cholecystectomy.^[5] Shoulder pain is seen in 40% of patients after laparoscopic cholecystectomy. This pain is referred pain caused by distension of the diaphragm. The shoulder pain might be intense in the early postoperative phase. It may last up to 2 weeks

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How to cite this article: Jepina P, Nandhini P, Parthasarathy S. Right sided stellate ganglion block before pneumoperitoneum in laparoscopic surgeries. Does it balance Hemodynamics? A case series. Asian J Pharm Res Health Care 0;0:0.

Access this article online

Quick Response Code:



Website: www.ajprhc.com

DOI: [10.4103/ajprhc.ajprhc_10_21](https://doi.org/10.4103/ajprhc.ajprhc_10_21)

postoperatively. Intraperitoneal bupivacaine to the diaphragm at the end of surgery has been effective in reducing both the intensity and frequency of shoulder pain.^[6] We postulated that targeting the stellate ganglion before establishment of capnoperitoneum will blunt the sympathetic surge. The additional advantage is that the sneaking of local anesthetic drug to the phrenic nerve may stop the afferents from the diaphragm. We present a case series of three such patients.

CASE CAPSULE

Case 1

A 48-year-old male patient with no comorbidities was posted for laparoscopic cholecystectomy. After shifting to the operating room, a peripheral line was taken and routine monitors including noninvasive blood pressure, electrocardiography, and peripheral oxygen saturation were connected. A baseline heart rate and blood pressures (systolic, diastolic, and mean pressures) were recorded. Fifteen minutes before anesthesia induction, the patients underwent ultrasound-guided stellate ganglion block (SGB) with 6–8 ml of 0.5% bupivacaine [Figure 1]. After 5 min, the patient was evaluated for Horner’s symptoms which include, enophthalmos, miosis, facial anesthesia, and flushing. The same was recorded. The patient was induced with routine and accepted doses of fentanyl, propofol, and vecuronium. All hemodynamic parameters such

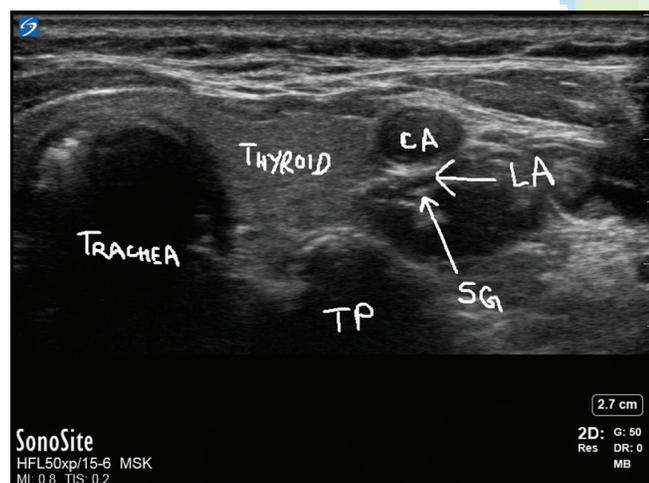


Figure 1: Showing stellate ganglion block. CA: Carotid artery, LA: Local anesthetic, TP: Transverse process, SG: Stellate ganglion

as blood pressure, heart rate, and arterial oxygen saturation were recorded before and after the creation of pneumoperitoneum. The hemodynamics were very stable. The heart rate and the mean arterial pressure increased by <5% after establishing capnoperitoneum. The changes were recorded for 10 min and positional change was allowed for the patient later.

Case 2

A 46-year-old male with no comorbid illness was posted for laparoscopic cholecystectomy. After shifting to the operating room, a peripheral line was taken and routine monitors were connected. A baseline heart rate and blood pressure were recorded. Fifteen minutes before anesthesia induction, the patient underwent ultrasound-guided SGB with 6–8 ml of 0.5% bupivacaine. After 5 min, the symptoms of the block were evaluated. The establishment of Horner’s syndrome was noted. The baseline hemodynamic parameters were recorded. The patient was induced with routine and accepted doses of fentanyl, propofol, and vecuronium as per the previous case. All hemodynamic parameters such as blood pressure, heart rate, and arterial oxygen saturation were recorded before and after the creation of pneumoperitoneum. The mean arterial pressure and the heart rate remained stable for the next 15 min.

Case 3

A 40-year-old female was posted for laparoscopic cholecystectomy. There were no comorbid illnesses and taken up as American Society of Anesthesiologists status I. As the patient preferred to get an injection after the establishment of unconsciousness, the patient was anesthetized as per the earlier two cases. After intubation, a similar ultrasound-guided SGB was administered with similar doses. The mean arterial pressure and the heart rate were stable after the block with a 5% reduction. After capnoperitoneum, the levels came back to normal. The difference in this case is the SGB being administered after general anesthesia. The duration of surgery was between 90 and 120 min in all the cases [Table 1].

Technique of ultrasound-guided stellate ganglion block

The patient is placed supine with the neck slightly extended with a pillow under the shoulder and turned

Table 1: Patient characteristics with haemodynamic changes

	Age (years)	Sex	Baseline heart rate	10 min after pneumoperitoneum (mmHg)	Baseline MAP (mmHg)	10 min after pneumoperitoneum (mmHg)
Case 1	48	Male	85	89	80	84
Case 2	46	Male	71	74	78	80
Case 3	40	Female	64	64	70	72

MAP: Mean arterial pressure

toward the left side. The high-frequency linear probe of the Sonosite X-Porte machine was used in all the cases. The probe was kept transverse in the neck and the transverse process of the sixth cervical vertebra was identified. The longus colli muscle between the carotid artery and the transverse process was also noted. The drug 6–8 ml of bupivacaine was injected between the longus colli and the carotid artery, and the movement of the drug along the plane was noted. There was also a minimal drug into the muscle. The position of the needle and drug movement in the correct plane confirmed the block.^[7] The establishment of Horner's syndrome was also found in the first two cases in 5 min. As the block was administered after anesthesia in the third case, only needle position and the spread were used for confirmation. There were no major side effects. All the patients were extubated according to the institutional protocol.

DISCUSSION

The stellate ganglion is formed by the fusion of inferior cervical and first thoracic sympathetic ganglia in front of the C6 and C7 transverse processes. Stimulation of the ganglion augments peak systolic pressure and enhances myocardial contractility because of its stimulating action on postganglionic nerve fibers of the myocardium. The blockage of inferior cervical cardiac nerves is found to be responsible for the bradycardia seen following SGB. The block has been used to control perioperative hypertension induced by the increased sympathetic surge. There are two precise clinical mechanisms involved in this concept. The first one is the fact that SGB inhibits the sympathetic stimulation, thereby decreasing capnoperitoneum-induced hypertension and tachycardia. The other fact is that the SGB can also affect the phrenic nerve which in itself can cause a decrease in diaphragmatic afferents of pneumoperitoneum.^[8,9] This concept may be responsible for early postoperative analgesia with SGB in laparoscopic surgeries. Hong^[10] has proved in his series of 45 cases that administration of preoperative SGB provided better hemodynamics after pneumoperitoneum. Our findings also go along with his results, but ours is a case series while he had a control group to prove its efficacy. He has also demonstrated less incidence of postoperative nausea and vomiting in the SGB group. Lignocaine was used in their study, while we used bupivacaine to utilize the other advantages. There were no major side effects. The extubation process was smooth in all the cases. There are a few more studies which have thrown light on the usefulness of SGB to attenuate hemodynamic storm.^[11,12] Choi *et al.*^[13] have shown that

the shoulder pain after arthroscopic shoulder surgery is decreased after SGB. This fact was taken into account by us to explain the twin mode of action of SGB after pneumoperitoneum. Our blocks were done with ultrasound guidance to ensure accurate deposition of the local anesthetic. The limitation of our observation is its low sample size without an adequate control group as this is a small case series.

CONCLUSION

In this case series, we conclude that a single-shot preoperative SGB with local anesthetics helps to blunt hemodynamic responses after capnoperitoneum without major side effects.

Declaration of patient consent

The authors declare that they have obtained consent from patients. Patients have given their consent for their images and other clinical information to be reported in the journal. Patients understand that their names will not be published and due efforts will be made to conceal their identity but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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