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THORACIC SPINAL ANESTHESIA (TSA) RESULTS, IN UPPER ABDOMINAL SURGERIES

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ABSTRACT

Introduction: Thoracic spinal anesthesia (TSA) is a valuable treatment that can be used for a variety of surgical approaches. The surgeon and the team should be aware that the choice of patient is crucial and that a thorough history and physical examination will determine who is eligible.
Objective: To determine the application of thoracic spinal anesthesia (TSA) in upper abdominal surgeries.
Study design: A cross-sectional study
Place and Duration: This study was conducted in King Abdullah Medical City, Makkah, from May 2021 to May 2022.
Methodology: This study evaluated 17 cases of TSA in admitted patients undergoing laparoscopic surgery and other upper abdominal procedures. Despite its rarity, thoracic spinal anesthesia is proven to be a harmless and current method for a variety of procedures. The treatment has been found to benefit these patients by maintaining hemodynamic stability and decreasing the negative effects associated with general anesthesia.
Results: In this study, there were 10 (58.8%) males and 7 (41.2%) females. The mean age, weight, height, and BMI were 36.71.28 ± 13.9 years, 45.7 ± 4.9 kg, 161.67± 4.1 cm, and 21.1± 3.2 respectively. Two patients out of 17 developed hypotension; one patient reported abdominal pain; and five patients developed pain in the tip of the shoulder intraoperatively. None of the required conversions into general anesthesia were performed; nausea and vomiting were reported in two patients, and none of the patients reported any itching in the study.
Conclusion: With sufficient sedation, thoracic and spinal anesthesia can be administered to normal and even high-risk patients without substantial intraoperative problems and with better postoperative

pain control. Giving thoracic spinal anesthesia may be an additional option for certain common surgeries because of enhanced patient safety, a shorter postoperative care stay, and better postoperative pain reduction.

Keywords: Thoracic Spinal Anesthesia, Abdominal Surgeries

INTRODUCTION.

The TSA, or thoracic segmental spinal anesthesia, is often used for patients in surgical settings who have serious medical issues and are considered a higher risk for general anesthesia. Most procedures are performed under general anesthesia; nevertheless, some downsides may involve unfavourable drug adverse effects, a prolonged prognosis, and insufficient pain management [1].

When doing procedures like laparoscopic surgery, the type of regional anesthetics known as thoracic segmental spinal anesthesia can be used in place of general anesthesia.

It is most commonly employed by individuals who are considered to be at high risk of problems from general anesthesia. [2]. Because the spinal cord terminates at L1, giving spinal anesthesia above the lumbar level, implying the thoracic level, increases the risk of spinal cord injury from the spinal needle [3].

Many recent studies have used MRI to investigate the anatomy of the thoracic spinal canal. A recent study of 300 patients who received thoracic spinal anesthesia found no neurological sequelae. Furthermore, the incidence of paresthesia experienced by patients undergoing thoracic spinal anesthesia was the same as that encountered by individuals undergoing lumbar spinal anesthesia. [4].

Spinal anesthesia has been linked to reduced emesis, less postoperative discomfort, a shorter postoperative stay, higher patient satisfaction, and enhanced overall safety in a variety of small laparoscopic operations. [5].

As a result, TSA may be used more frequently in the future. There are various advantages to selectively administering spinal anesthesia in the desired region, allowing the blockade to occur just in a few particular parts of the body. There is no anesthetic effect in the lower extremities because there is no caudal diffusion of the drug, which is advantageous to individuals. There is no veso-dilation in much of the body during thoracic spinal anesthesia, but there is compensation for variations in blood pressure. Only particular nerve functions are blocked in a certain area of the spinal cord.

It also has the advantage of requiring only a small amount of anesthetic agents. Thoracic spinal anesthesia has more muscular relaxation and neither central nor peripheral depression of respiration or circulation when compared to general anesthesia. There is also the advantage of not needing any other type of analgesic to control post-operative pain. Because patients have gained mobility in their legs during surgery, there is early postoperative ambulation, which increases patient satisfaction and decreases anxiety during the treatment [6]. This study focuses on the role of the interprofessional team in the treatment of patients who have undergone thoracic segmental spinal anesthesia.

METHODOLOGY

During the pre-anesthesia checkup one day before surgery, all patients were informed about the process. On the day of operation, informed written consent was obtained. All were informed about the procedure's effects as well as the opportunity to convert to general anesthesia if they were dissatisfied with spinal anesthesia at any point throughout the surgery. We followed the routine procedures like maintaining the I/V line, taking antibiotic prophylaxis, and giving Informed consent. Through a nasal cannula, all patients received additional oxygen at a rate of 3 L/min.

Following spinal anesthesia, fentanyl (1 g/kg) and midazolam (1 mg) were administered. With the patient in left lateral decubitus or sitting, we used a 25-gauge Quincke needle to puncture the T9–T10 subarachnoid area through a median or paramedian.

Isobaric injection for spinal anesthesia with levobupivacaine 0.5% (2 cc) was combined with dexmedetomidine (5 mcg). Following the spinal injection, the patients were positioned supine. The T4-dermatome level was chosen as the target for the spinal block (as measured by pinpricks at 1-minute intervals).

RESULTS

In this study, there were 10 (58.8%) males and 7 (41.2%) females. The mean age, weight, height, and BMI were 36.71.28 ± 13.9 years, 45.7 ± 4.9 kg, 161.67± 4.1 cm, and 21.1± 3.2 respectively. (As shown in Table I.)

Table I: Social and demographic information about the study participants

Characteristics	**Number of Patients (N=14)**	
Categorical Variable	**n**	%
Male	10	58.8
Female	7	41.2
Numerical Variable	**Mean and SD**	
Age (Mean ± SD)	36.71.28 ± 13.9 years	
Weight(Mean ± SD)	45.7 ± 4.9 kg	
Height(Mean ± SD)	161.67± 4.1 cm	
Body Mass Index(Mean SD)	21.1± 3.2	

There were 17 patients, 12 of whom had laparoscopic procedures, including 7 laparoscopic cholecystectomies, 3 laparoscopic appendectomies, six open upper abdominal surgeries and two diagnostic laparoscopies, (As shown in Table II).

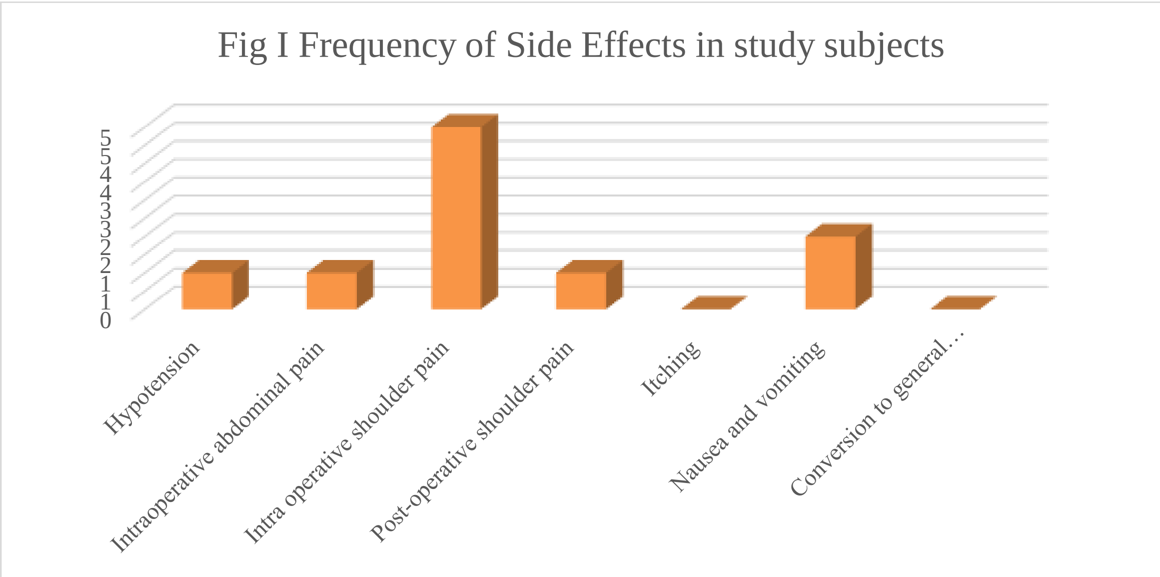
Table II Patients are distributed based on the type of procedure. (n= 17)

Surgical Approach	**n**	**%**
Laparoscopic Surgery	12	70.59
Cholecystectomy	7	41.18
Appendicectomy	3	17.65
Diagnostic laparoscopy	2	11.76
Open abdominal Surgery	6	35.29

Two patients out of 17 developed hypotension, 1 patient reported abdominal pain and 5 patients developed pain in the tip of the shoulder intraoperatively. None of the required conversion into general anesthesia, Nausea and vomiting was reported in 2 patients and none of the patients reported any itching in the study (As shown in Table III) the frequency of side effects reported in the study is diagrammatically presented in Fig. I.

Table III: Frequency of Side Effects in study subjects

Side Effects	**Yes**	**No**
Hypotension	**1**	16
Intra-operative abdominal pain	1	16
Intra-operative shoulder pain	5	12
Post-operative shoulder pain	1	16
Itching	0	17
Nausea and vomiting	2	15
Conversion to general anesthesia	0	17



Patients' dermatomal levels were examined postoperatively (As shown in Table IV), and the duration of motor and sensory blockage was recorded. All patients were monitored for neurological sequelae for 24 hours. None of the individuals had any lingering neurological consequences.

Table IV Post-Operative Motor and Sensory Blockade

Level of sensory block Upper dermatome(level)	
15 min	T3
330 min	T3
60 min	T4
75 min	T4
90 min	T6
Lower dermatome	
15 min	L3
30 min	L3
30 min	L3
60 min	L2
90 min	L2
120 min	L2

(T-Thoracic, L-Lumbar)

DISCUSSION

Thoracic spinal anesthesia is a valuable treatment that can be used for a variety of surgical approaches. However, major concerns that the surgeon and team should have are that the choice of the patient is highly important, and who is eligible will be determined by a complete history and physical examination.

The risk of spinal cord injury increases when spinal anesthesia is administered above L1. At the mid-thoracic levels, the depth of the posterior subarachnoid space is greater than at the lumbar and upper thoracic levels. This means that anaesthetic drugs can be administered intravenously while avoiding spinal cord touch in the thoracic region [7]. Thoracic segmental spinal anesthesia causes certain hemodynamic alterations, but they are less severe than lumbar spinal anesthesia. Since we utilised less medication, resulting in a lower drug dilution concentration and hence less chance of hemodynamic abnormalities [8] [9].

Certain high-risk patients carry a high risk of morbidity and mortality, as well as the need for postoperative ventilation. In such instances, this approach is safe to use. This technique has a number of advantages, including the use of painkillers after the surgical procedure, which reduces the use of opioids and their associated side effects for post-operative pain; the ability to preserve extemporaneous breathing and air inhalation; and the benefit of remaining cognizant throughout the procedure, which reduces post-operative intellectual and cognitive malfunction. Gastric motility recovers more quickly, and post-operative discomfort decreases. Because the patient does not require a post-operative ventilator, the length of hospital stay, as well as needless sedation or paralysis for the ventilator, can be avoided, as can the financial burden on the patient [4] [10] [11].

In this study, we observed certain side effects among 17 patients, two of whom developed hypotension. 1 patient reported abdominal pain; 5 patients developed intraoperative shoulder tip pain; and nausea and vomiting were reported in 2 patients. Minor issues, on the other hand, are common and should not be overlooked. Minor problems that are more common include hypotension, nausea and vomiting (which is usually triggered by hypotension), bradycardia, paresthesia, transitory mild hearing impairment, backache, urine retention, and TNS. Finally, while considered a "minor" effect, post-dural puncture headaches can be highly distressing for patients and are prevalent [12] [13].

CONTRAINDICATIONS

Multiple sclerosis and other demyelinating disorders, sepsis, severe hypovolemia, and coagulopathy are all considered relative contraindications. Depending on the severity of the coagulopathy, spinal anesthesia may be recommended. Other related contraindications include significant mitral and aortic stenosis, as observed in hypertrophic obstructive cardiomyopathy, and left ventricular outflow obstruction [14].

CONCLUSION.

With sufficient sedation, thoracic and spinal anesthesia can be administered in normal and even high-risk patients without substantial intraoperative problems and with better postoperative pain control. Giving thoracic spinal anesthesia may be an additional option for certain common surgeries because of enhanced patient safety, a shorter postoperative care stay, and better postoperative pain reduction.

REFERENCES

1. Chin KJ, Karmakar MK, Peng P. Ultrasonography of the adult thoracic and lumbar spine for central neuraxial blockade. Anesthesiology. 2011 Jun;114(6):1459-85
2. Sagar A, Soujanya M, Porika R, Dhavanam JY. Anaesthetic management of cases where Thoracic segmental spinal anesthesia a suitable alternative to general anesthesia. Eur J Mol Clin Med. 2022;9(3):10286–92.
3. Ellakany MH. Thoracic spinal anesthesia is safe for patients undergoing abdominal cancer surgery. Anesth Essays Res. 2014;8(2):223–8.
4. Imbelloni LE. Spinal anesthesia for laparoscopic cholecystectomy: Thoracic vs. Lumbar Technique. Saudi J Anaesth. 2014;8(4):477–83.
5. Hamad MA, El-Khattary OAI. Laparoscopic cholecystectomy under spinal anesthesia with nitrous oxide pneumoperitoneum: a feasibility study. Surg Endosc. 2003;17(9):1426–8.
6. Elakany MH, Abdelhamid SA. Segmental thoracic spinal has advantages over general anesthesia for breast cancer surgery. Anesth Essays Res. 2013;7(3):390–5.
7. Lee RA, Zundert AAV, Breedveld P, Wondergem JH, Peek D, Wieringa PA. The anatomy of the thoracic spinal canal investigated with magnetic resonance imaging (MRI). Acta Anaesthesiol Belg. 2007;58(3):163–7.
8. Tummala V, Rao LN, Vallury MK, Sanapala A. A comparative study- efficacy and safety of combined spinal epidural anesthesia versus spinal anesthesia in high-risk geriatric patients for surgeries around the hip joint. Anesth Essays Res. 2015;9(2):185–8.
9. Olawin AM, Das J. Spinal Anesthesia [Internet]. Treasure Island (FL): StatPearls Publishing; 2022.
10. Yousef GT, Lasheen AE. General anesthesia versus segmental thoracicor conventional lumbar spinal anesthesia for patients undergoing laparoscopic cholecystectomy. Anesth Essays Res. 2012;6(2):167–73.
11. Shatri G, Singh A. Thoracic Segmental Spinal Anesthesia. In: StatPearls [Internet. StatPearls Publishing; 2022.
12. Hartmann B, Junger A, Klasen J, Benson M, Jost A, Banzhaf A, Hempelmann G. The incidence and risk

factors for hypotension after spinal anesthesia induction: an analysis with automated data collection. Anesth Analg. 2002 Jun;94(6):1521-9, table of contents.

13. Tarkkila P, Isola J. A regression model for identifying patients at high risk of hypotension, bradycardia and nausea during spinal anesthesia. Acta Anaesthesiol Scand. 1992 Aug;36(6):554-8.
14. Carpenter RL, Caplan RA, Brown DL, Stephenson C, Wu R. Incidence and risk factors for side effects of spinal anesthesia. Anesthesiology. 1992 Jun;76(6):906-16.