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Thoracic Spinal Anesthesia In Mammae Tumors Excision Surgery

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ABSTRACT

Thoracic spinal anesthesia (TSA) is a regional anesthetic technique where the local anesthetic is injected into the thoracic subarachnoid space. It provides rapid onset of sensory and motor block, with segmental anesthesia suitable for surgeries in the thoracic and upper abdominal regions. Compared to general anesthesia (GA), TSA offers various advantages, including hemodynamic stability, decreased stress response, and superior postoperative pain control. We present a case of a 46-year-old female undergoing excision of a left breast tumor under thoracic spinal anesthesia at the T6–T7 level. The procedure was completed successfully without complications, and the patient reported satisfactory intraoperative and postoperative experiences. TSA can be a safe and effective alternative to GA in selected breast surgery cases, with potential benefits including reduced opioid use, stable intraoperative hemodynamics, and faster recovery.

Introduction

Thoracic segmental spinal anesthesia is typically used for patients undergoing surgery with major medical problems who are considered at greater risk for general anesthesia. General anesthesia is the standard for most surgeries; however, some of its drawbacks can include negative drug side effects, prolonged recovery, and inadequate pain control. There is currently renewed interest in thoracic segmental spinal anesthesia for some common surgeries. Intrathecal injection of anesthetic into the desired body level and above where the spinal cord terminates has been shown to be beneficial in these specific circumstances.[1] Spinal anesthesia has several complications, including hypotension, total spinal, nausea and vomiting, PDPH, pain or pain during spinal needle injection, and others (Soenarjo & Jatmiko, 2010). Pain or pain during spinal needle injection is one of the disadvantages of spinal anesthesia, so it needs to be treated (Erdem & Mesut, 2011). Pain is an unpleasant sensory and emotional experience associated with actual, threatened, or

imagined tissue damage.[2] Thoracic spinal anesthesia may provide an alternative for these common operations: improving patient safety, reducing the length of stay after anesthesia, and providing better postoperative pain relief. This review aims to describe the technique, indications, contraindications, and highlight the role of the interprofessional team in the management of patients undergoing thoracic segmental spinal anesthesia.[1]

Since the first thoracic spinal anesthesia was performed in early 1908, many anesthesiologists have been interested in this unusual neuraxial anesthesia technique. The main rationale for its use is to prevent complications associated with general anesthesia in a high-risk patient population.[3]

Subarachnoid myelography by neurologists in the past was performed using cervical and thoracic punctures into the subarachnoid space. However, the thoracic approach has proven to be an effective and feasible method for a variety of thoracic, abdominal, and lower limb surgeries with an acceptable safety profile. Mahmoud et al. used spinal anesthesia at the thoracic T10 level to perform breast surgery successfully; however, the incidence of hemodynamic instability was observed at 16%.[4]

There is significant debate regarding this practice worldwide due to concerns regarding the fear of iatrogenic spinal cord injury, spread of local anesthetic causing complete spinal block, and hemodynamic instability due to cardioaccelerator sympathetic fiber blockade. However, thoracic spinal anesthesia has been shown to be a safe and effective method for a variety of surgeries, including laparoscopic cholecystectomy, breast cancer lumpectomy, and abdominal cancer surgery.[3,5]

The administration of thoracic spinal anesthesia may be an alternative option for commonly performed surgeries because it can improve patient safety, reduce post-anesthesia hospitalization, and provide better postoperative pain relief. This review aims to describe the technique, indications, contraindications, and highlight the role of the interprofessional team in the management of patients undergoing thoracic segmental spinal anesthesia.[4]

Method

A Case report from A 49-year-old woman was admitted to the hospital with a complaint of a lump in her right breast for 1 month, the patient said there was no pain in her right breast. Cramps and aches were felt in her right hand. The patient had a cough with phlegm, complaints such as fever, flu, shortness of breath, headache, dizziness, nausea and vomiting were denied. Urination seemed smooth. Defecation seemed normal. There was a family history of Diabetes Mellitus. History of surgery in 2017 surgery on both breasts. On examination of vital signs, the patient was found to be in moderate pain, blood pressure 112/60 mmHG, pulse 67 times per minute (within normal limits 60-100 times per minute), temperature 36.6 0C (within normal limits 36.1-37.2 oC), oxygen saturation or SpO2 99% (within normal limits> 95%), and breathing 20 times per minute (within normal limits 16-20 times per minute). On neurological examination, consciousness or GCS 15 (E4M6V5) was obtained, which means the patient is in a state of compos mentis or full consciousness, On physical examination, a lump was found in the right mammae region measuring approximately 17x8x16 mm. On examination of the head, thorax,

abdomen and extremities were found to be within normal limits. On supporting examination in the form of ultrasonography (USG) of the Mammae, the results were obtained on the right mammae Slightly hypoechoic lesion with clear boundaries, thin walls in the subcutis areola of the right mammae, 11 o'clock direction, size 17.85 x 8.26 x 16.37 mm, Normal fibroglandular breast tissue, Ductus lactiferus does not appear dilated, Axillary tail right normal, no pathological lesions are seen in it, On the left mammae, the results were Normal fibroglandular breast tissue. there are no hyper or hypoechoic lesions in it, Ductus lactiferus does not appear dilated, Axillary tail dextra is normal, no pathological lesions are seen in it. Impression of subcutaneous cyst of areola mamma dextra.

In supporting laboratory examinations of complete blood chemistry examinations, hemoglobin levels were found to be 11.5 g / dL, leukocytes 8,500 / µL, hematocrit 36.6%, and platelets 276,000 / µL. The anesthetic technique chosen was SAB anesthesia. The patient was positioned supine, an i.v. catheter no. 18 G was attached to the left back, RL maintenance fluid 2800 cc / 24 hours, 116 cc / hour (38 drops / minute) macrodrip when fasting began. Install a monitor for ECG monitoring, blood pressure, pulse rate, respiration, and oxygen saturation. The patient is positioned in Left Lateral Decubitus (LLD): Identify the T7-8 interspace, disinfect with 70% alcohol and Betadine, skin wheal with 2% lidocaine 40 mg. Insertion of Spinocan no.25 G in the T7-8 interspace, paramedian approach, CSF (+) flowing clear, blood (-), barbotage (+), injection of Bupivacaine 0.5% 6 mg + Fentanyl 25 mcg + sedation midozalom 2mg/iv. The patient is positioned supine, check the height of the block with a pin prick test, a sensory block is obtained at the level of dermatome Th2 - Th10. Administer oxygen 2 liters/minute via nasal cannula. Administer a urinary catheter. Empty the urine bag. The operation lasted for ± 1 hour 30 minutes, the hemodynamic condition during the operation was stable. The patient was transferred to the PACU room.

Result and Discussion

In the case illustration, it is presented that the female patient Mrs. F is 43 years old with a complaint of a lump in the right breast. After a physical examination and supporting examination, the patient was diagnosed with Ca Mammae dextra with ASA physical status II. The anesthetic technique chosen was Thoracic segmental spinal anesthesia, usually used for patients undergoing surgery with major medical problems who are considered to have a greater risk for general anesthesia. Spinal anesthesia is produced from pharmacological denervation at the spinal cord level by injecting a concentration of local anesthetic into the subarachnoid space, blocking deep sensory, motor, and sympathetic. Spinal anesthesia performed above lumbar 1 and 2 (L1 / L2) is known as Thoracic Spinal Anesthesia (TSA). During the operation, there were no significant obstacles either in terms of anesthesia or the operation itself. During the recovery room, there was nothing that required serious treatment. In general, the implementatio of the operation and anesthesia management went well and safely.

Thoracic spinal anesthesia is the performance of spinal anesthesia at the thoracic vertebral level. It has been described at thoracic levels as high as

the T4/T5 intervertebral space and as high as T10/T11.

This technique has been used as a single-shot spinal anesthesia, continuous thoracic spinal anesthesia, or both; using long-acting local anesthetic agents, usually levobupivacaine, bupivacaine, or ropivacaine, with both hyperbaric and isobaric formulations used.[2] Hyperbaric bupivacaine provides a more prolonged sensitive block than isobaric solutions, making it more suitable for thoracic spinal anesthesia. [6]

Spinal anesthesia has several advantages over general anesthesia. These include: fewer respiratory and cardiac complications, greater suppression of the neuroendocrine stress response to surgery, better intraoperative and postoperative pain control, earlier recovery of gastrointestinal function, less postoperative nausea and vomiting, earlier ambulation and hospital discharge, lower incidence of deep vein thrombosis, lower rates of surgical site infection, reduced need for blood transfusion, and reduced costs. A significant advantage of spinal anesthesia is the avoidance of airway instrumentation and its potential complications.[3,7,]

In surgical procedures involving lower thoracic or upper abdominal dermatomes, high thoracic block with spinal anesthesia can be achieved by using high-dose bupivacaine (20-40 mg) at the lumbar puncture site or low-dose bupivacaine (5 mg) at the thoracic puncture site. In lumbar spinal anesthesia, sympathetic block extends to the lower extremities resulting in vasodilation and reduced preload, whereas in thoracic spinal anesthesia, sympathetic block is limited to a smaller dermatome with minimal involvement of the lower extremities; therefore, the reduction in preload and blood pressure is less pronounced.[8,9]

Imbelloni et al concluded that the use of spinal anesthesia at the thoracic level reduced the dose of hyperbaric bupivacaine required in combination with fentanyl for laparoscopic cholecystectomy, with less hemodynamic instability and shorter duration of sensory and motor blockade compared with conventional-dose lumbar spinal anesthesia. Thoracic nerve roots are thinner than lumbar nerve roots with reduced cerebrospinal fluid volume at this level, allowing for more efficient nerve blockade due to less dilution of local anesthetic agents; thus, a smaller volume of local anesthetic is required for adequate nerve blockade.[9]

In addition, in orthopedic surgery, the duration of motor block was significantly longer with lumbar spinal anesthesia compared with thoracic spinal anesthesia, but hypotension was more pronounced in the lumbar spinal anesthesia group. Because of the minimal lower extremity motor involvement with thoracic spinal anesthesia, patients were able to ambulate more quickly compared with lumbar spinal anesthesia.[3]

Thoracic segmental spinal anesthesia is currently best suited for certain procedures and patient populations. Thoracic spinal anesthesia (TSA) is a technique involving the administration of local anesthetics into the subarachnoid space at the thoracic level. Although less commonly used than lumbar spinal anesthesia, TSA has gained interest due to its ability to provide segmental anesthesia suitable for surgeries above the umbilicus, such as breast and upper abdominal surgeries. This case report highlights the use of TSA in a patient undergoing breast tumor excision and discusses its benefits and safety profile compared to

general anesthesia. These typically include shorter procedures with patients who are considered to be at high risk for perioperative morbidity and mortality under general anesthesia or patients who are unwilling to undergo general anesthesia. In addition, patients who are unable to undergo traditional spinal anesthesia in the lumbar region may also benefit. Individuals at risk tend to be older patients who have decreased physiologic reserve, comorbidities, polypharmacy, cognitive dysfunction, and frailty.[10]

The literature describes that thoracic spinal anesthesia can be performed between the T4 and T12 vertebral levels, depending on the type of surgery performed. The distance between the dura mater and the spinal cord was measured as 5.19 mm at T2, 7.75 mm at T5, and 5.88 mm at T10. The distance between the needle tip and the posterior surface of the spinal cord was found to be greater on MRI due to the angulation between T5 and T6 (almost 50°). MRI also confirmed that the spinal cord and cauda equina touch the dura mater posteriorly in the lumbar region and anteriorly in the thoracic region. This could be a possible explanation for the low incidence of neurological complications during thoracic epidural block in case of inadvertent dural perforation. For thoracic surgery, with special reference to breast surgery, thoracic spinal anesthesia is described at the T5/T6 level, with a local anesthetic volume of 1.1-1.4 ml, and a sensory block distribution between T1 and T11.[11]

Therefore, thoracic spinal anesthesia at the T1 to T4 vertebral level is feared to cause hypotension and bradycardia because the location is the cardioaccelerator area. In addition, it can bring the possibility of inadequate ventilation due to the extensive thoracic nerve block. However, the diaphragm, which is the main inspiratory muscle, remains unaffected because it is innervated from the cervical level, and expiration is a passive phenomenon under normal conditions. However, coughing, voluntary deep breathing and forced expiration are affected to some extent because they are carried out mainly by the intercostals and anterior abdominal wall muscles innervated by the thoracic nerves. Hemodynamic stability in patients undergoing high thoracic spinal anesthesia is due to the right atrial filling being well maintained.[12]

Neuroaxial anesthesia (NA) has been used as the sole anesthetic technique in thoracic surgery in patients with severe respiratory disease. The benefits of awake thoracic surgery under NA include: awake and spontaneously breathing patients, faster recovery, shorter hospital stay, lower costs, assumed non-inferior efficacy compared with conventional approaches, and fewer minor and major morbidities. Procedures in which awake thoracic surgery under thoracic epidural anesthesia has been performed include: pulmonary nodule resection, wedge resection of non-small cell lung cancer, videothoracoscopic metastectomy, videothoracoscopic talc pleurodesis, management of anterior mediastinal masses, management of thoracic empyema, and thymectomy in patients with myasthenia gravis. Issues of debate in this population group include: lack of large RCTs, potential increased surgical risk, specialized training required, and specific side effects associated with regional anesthesia or NA. Therefore,

further research is needed regarding the safety and efficacy of thoracic spinal anesthesia in awake thoracic surgery.[13]

The primary site of action of neuraxial blockade (including spinal anesthesia) is the nerve root. Local anesthetics are injected into the cerebrospinal fluid (CSF) and bathe the nerve roots in the subarachnoid space. Direct injection of local anesthetics into the CSF for spinal anesthesia allows relatively small volumes and doses of local anesthetic to achieve strong sensory and motor blockade. [14]

Thoracic spinal anesthesia is a useful and useful procedure for a variety of surgical procedures. However, there are significant risks that need to be considered by the health care team. Patient selection is an important aspect, and a detailed medical history and physical examination will determine who is eligible. The indications for thoracic spinal anesthesia should be appropriate to the patient's surgical needs. After surgery, the postoperative team should be aware of the procedure, and the patient should be closely monitored to ensure hemodynamic stability. Monitoring in the postoperative period should be carried out until the anesthesia wears off.[15]

Figure 1. Skin Marking

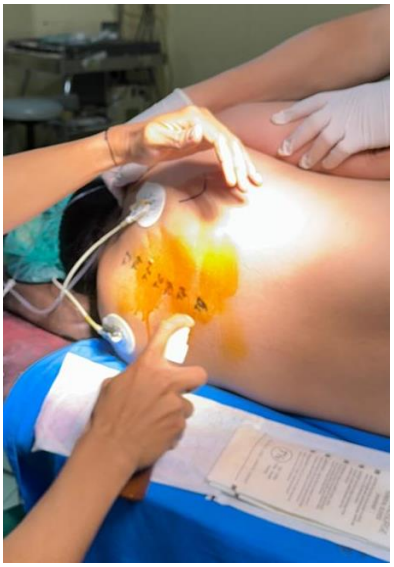

Figure 2. Disinfection

Figure 3. Needle Insertion

Figure 4. Barbotage (+),CSF (+), Blood (-)

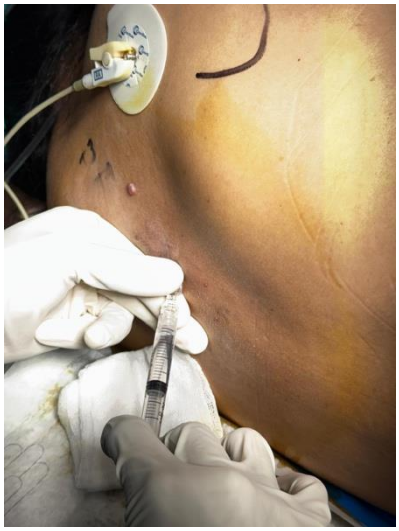

Figure 5. Insertion of Anesthetic Drugs

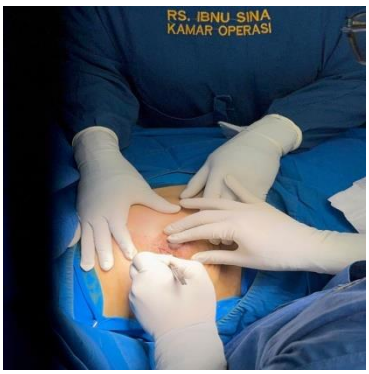

Figure 6. Operation in Progress

Discussion

TSA provides several advantages for breast surgeries, including reduced postoperative nausea and vomiting, early ambulation, and decreased use of systemic opioids. Although concerns exist regarding the safety of thoracic puncture due to proximity to the spinal cord, recent literature supports its safety when performed by experienced anesthesiologists using appropriate technique. This case supports the growing evidence that TSA is a viable option for selected breast surgeries, particularly in patients who may benefit from avoiding general anesthesia.

Conclusion

Thoracic spinal anesthesia is one of the regional anesthesia techniques that has several advantages, namely better pain control than general anesthesia, lower postoperative side effects, faster recovery and minimal intra- and postoperative hemodynamic changes. These advantages are the considerations for this anesthetic technique to be chosen in patients with a diagnosis of CA Mammae dextra with wide excision surgery. In these patients, it was found that thoracic spinal anesthesia was effective and safe. Monitoring during and after surgery showed good results without any complications and significant hemodynamic fluctuations. Although there are no larger trials, there is evidence from small cohort studies and several case reports that thoracic spinal anesthesia can be considered a safe, feasible and effective alternative anesthetic technique, and can be used in patients who are at higher risk.

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