ULTRASOUND GUIDED BILATERAL INTERMEDIATE CERVICAL PLEXUS BLOCK AS AN ALTERNATIVE TO GENERAL ANAESTHESIA IN PATIENT FOR TOTAL THYROIDECTOMY WITH DIFFICULT AIRWAY: CASE SERIES.

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ABSTRACT

Background: **Total thyroidectomy is traditionally performed under general anaesthesia, which can be challenging in patients with difficult airways. This case series explores the use of ultrasound-guided bilateral intermediate cervical plexus block (US-BICPB) as an alternative anaesthetic technique for patients undergoing total thyroidectomy with potential or actual difficult intubation.**

Methods: **Four patients scheduled for total thyroidectomy with identified difficult airway management were included. US-BICPB was performed using a mixture of 0.5% bupivacaine and 1% lidocaine with adrenaline. Sensory block was assessed, and patients were monitored for hemodynamic stability, pain scores, and adverse events.**

Results: **All four patients successfully underwent total thyroidectomy under US-BICPB without conversion to general anaesthesia. Patients remained hemodynamically stable throughout the procedures, with pain scores remaining at 2 or below on the Numerical Rating Scale (NRS) for several hours postoperatively. No major complications were reported. Patients expressed satisfaction with the technique and were discharged within 2-3 days post-surgery.**

Conclusion: **US-BICPB appears to be an effective and safe alternative anaesthetic technique for total thyroidectomy in patients with difficult airways. This approach may offer advantages in terms of airway management, postoperative pain control and patient satisfaction. Further studies with larger sample sizes are needed to confirm these findings and establish optimal protocols for patient selection and block administration.**

Keywords: Dementia, Older adults, Clinical profile, Clinical pattern, Comorbidity, Behavioural symptoms

INTRODUCTION

Thyroid disease is the second most common endocrine disease in Africa and Nigeria.[1,2] One of the modalities for treatment of goiter is thyroidectomy, a surgery commonly done for the removal of an enlarged thyroid glands, the commonest cause of thyroid gland enlargement in our environment is simple multinodular goiter [2,3]

Thyroidectomy is usually done under general anaesthesia for adequate relaxation and largely because of airway concerns.[4] However, cases done under local anaesthesia and bilateral subcutaneous cervical plexus blocks have been reported. It is said to offer better post operative analgesia while also eliminating the need for endotracheal intubation which might be difficult considering the relation of the mass to the larynx and trachea and in situations of huge thyroid mass. [4,5]

Thyroidectomy produces mild to severe pain, particularly within 24 hours of operation. Surgical operations or general anaesthesia can induce discomfort in swallowing, a burning sensation in the throat, nausea, and vomiting. Several attempts have been undertaken to prevent and treat these complications, including the use of opioids and nonsteroidal anti-inflammatory medications under local or regional anaesthesia [5,6.] There are different adjuncts that have been explored in management of intraoperative and post operative pain in thyroid surgery which include local wound infiltration and bilateral cervical plexus block whether deep or subcutaneous (intermediate or superficial). Bilateral cervical plexus block for thyroidectomy is alternative form of anaesthesia for thyroid operations. This could be combination of deep and subcutaneous block or only subcutaneous with the same efficacy.[5]

Different methods like landmark method and ultrasound guided method have been employed in cervical plexus block successfully.[4,5] Ultrasound guidance was, however, found to be more effective

in pain reduction and safer as it reduced need for high dose local anaesthetic agent and risk of intravascular drug.[5] When faced with a patient for total thyroidectomy with a difficult airway, ultrasound-guided bilateral subcutaneous cervical plexus block can be considered as a valuable alternative. This technique offers a safe and effective method for providing intraoperative and postoperative analgesia, while reducing the need for general anaesthesia. In addition, it can help minimize the risks associated with airway management in patients with challenging airways. By targeting the cervical plexus under ultrasound guidance, precise and localized anaesthesia can be achieved, leading to improved patient outcomes and satisfaction. In this article, we explored the benefits and techniques of ultrasound-guided bilateral intermediate cervical plexus block (US- BICPB) in the context of total thyroidectomy with difficult airway.

We report four cases of total thyroidectomy done under ultrasound guided cervical plexus block in patients with potential and actual difficult intubation at University College Hospital, Ibadan.

BLOCK PROTOCOL

A detailed pre-anaesthetic assessment was carried out on every patient at the pre-anaesthesia clinic prior to admission for surgery, and relevant biochemical, haematological and radiological investigations were done for each patient based on the requirements of the surgery. These included at least a full blood count with differentials, electrolytes, urea and creatinine and a chest X-ray.

All necessary anaesthesia equipment such as the nerve stimulating needle, high frequency ultrasound probe, hypodermic needles and syringes, anaesthesia machine and laryngoscope with other accessories, medications, anaesthetic agents, and resuscitation equipment including those for general anesthesia and emergency airway access (gum elastic bougie, video laryngoscope, front of neck access devices) were checked and kept ready.

All the patients received 4 mg dexamethasone as antiemetic and for the block, a local anaesthetic mixture comprising 10 ml of 1% lidocaine, 10 ml of 0.5% bupivacaine. A sterile anaesthetic tray was prepared with sterile gauzes/towels; a mixture of 10 ml of 0.5% bupivacaine and 10 ml of 1% lidocaine; sterile gloves, one 2 ml syringes with 25-gauge needle for infiltration of the skin, and two 10 ml syringes and one 23 gauge stimulating needle for injection of local anaesthetic.

All patients were placed in the supine position and the neck rotated away from the side to be blocked. The area was then disinfected with 10 % povidone-iodine prior to commencement of the block performance (Figure 1). In this position, the cervical plexus was identified using an ultrasound machine. The ultrasound probe (covered with sterile transparent nylon cover) was placed on the posterior border of the sternocleidomastoid muscle across the midpoint between the mastoid process and the clavicle visualization of the plexus possible (coincide with C4-C5 level). Under ultrasound guidance using a linear probe with a frequency of 5 - 10 MHz in the transverse position (Figure 2), the posterior border of the sternocleidomastoid muscle was identified and centralized on the screen (Figure 3). The needle was then inserted using the in-plane technique after the overlying skin had been infiltrated with 1 ml of 1% lidocaine till the needle tip reaches space under the sternocleidomastoid muscle between the prevertebral fascia and the investing layer of the deep cervical fascia.

A 10 ml volume of the drug regimen (0.5% Bupivacaine and 1% lidocaine with adrenaline) was then injected (Figure 4). Oxygen was supplied via nasal prongs and the patient sedated with titrated doses of intravenous midazolam (starting with 2 mg given over 10-15 seconds) to achieve a Ramsay sedation score of 2-3.

The degree of sensory block was evaluated based on the dermatomal areas corresponding to the cervical plexus. This was measured at 2-min intervals for the first 10 min, with time 0 being the time of final block needle removal. The sensory block was assessed using a pinprick test and graded as Grade 0 (sharp pin felt), Grade 1 (analgesia, dull sensation felt), or Grade 2 (Anaesthesia, no sensation felt). Patient was also asked to score the pain using the Numerical rating scale (NRS) at each sensory assessment. The point of surgical anaesthesia was defined as the achievement of sensory block grade of 2 with pin prick test. A block was successful when a surgical procedure was carried out without any need for general anaesthesia. During the anaesthesia block placement and surgical procedure, the patient was constantly evaluated for adverse events. This included metallic taste, numbness of the lips and tongue, disorientation, loss of consciousness, cardiac dysrhythmias, seizures, cardiac and/or difficulty with respiration. Also, adverse events from the procedure itself such as haematoma formation from blood vessel puncture or paraesthesia and numbness from nerve damage were recorded. The first request for analgesia, patient satisfaction and pain score at this time were assessed by the attending nurse and recorded in the post anaesthesia care unit (PACU).

Fig. 1: Patient positioned supine and skin prepped with povidone Iodine.

CASE 1

AF, a 42-year-old female, obese, known hypertensive with a 5-year history of progressively enlarging anterior neck swelling and 2-year history of voice change. She had no history of heat or cold intolerance and no swelling in any other part of the body but there was positive history of snoring and daytime somnolence. She had her surgery postponed twice in the preceding month due to failed endotracheal intubation and was subsequently referred to pre-anaesthesia clinic where she was counselled for surgery under regional anaesthesia.

Examination revealed a middle-aged woman, obese with some noisy breathing, not pale, anicteric, acyanosed, not dehydrated and no pedal oedema. The patient presented with a heart rate of 80 beats per minute, a respiratory rate of 16 breaths per minute, a blood pressure of 130/90 mmHg and a temperature of 37.4 degrees Celsius. A large, asymmetrical mass was evident on the anterior neck, extending further to the left than the right. The mass was firm, nodular, and non-tender, with no skin discoloration or differential warmth. It was not attached to the overlying skin. While the mass could be palpated superiorly, it was not palpable inferiorly. The trachea was significantly deviated to the right. Cardiovascular and respiratory examinations were otherwise normal. Investigations including a full blood count, electrolyte levels, urea and creatinine levels, and thyroid function tests were all within the normal range. An electrocardiogram was also normal.

Intraoperatively, two 18G intravenous lines were instituted for fluid and intravenous drug administration. Monitors including ECG, pulse oximeter and noninvasive blood pressure monitor were attached, and baseline readings recorded. Difficult airway cart containing gum elastic bougie, video laryngoscope, front of neck access devices was also prepared ready. The ultrasound guided intermediate cervical plexus block was then done with 0.5% Bupivacaine and 1% lidocaine with adrenaline on both sides of the neck. The block was assessed and found adequate about 10minutes after institution of the block. Surgery commenced subsequently and patient placed on intranasal oxygen 2L/minute and sedated with 2mg of intravenous midazolam as anxiolytics, also had 5mg of labetalol twice for the control of the blood pressure. 480grams of thyroid tissue was delivered from the neck and haemostasis was subsequently secured. Estimated blood loss at surgery was 800mls and she had 1 unit of blood transfused. Patient was able to communicate throughout the procedure. Surgery lasted for 105minutes. NRS score at end of surgery was 2 and this remained so till discharge from PACU. The first request for analgesia was at about 10 hours after block institution. She was subsequently discharged home on the third day with no adverse events for postoperative follow up at the clinic.

CASE 2

OA, a 37-year-old female with a 2-year history of progressively enlarging anterior neck swelling and symptoms of toxic goitre evidenced by elevated thyroid hormone levels, tachycardia, heat and cold intolerance and anxiety. She was managed with tabs carbimazole and propranolol till she became euthyroid. Surgery was rescheduled twice due to anxiety and patient refusal to undergo general anaesthesia due to negative reports she had heard previously from people who underwent similar surgeries and her personal fear of not waking up from anaesthesia. She was subsequently counselled for surgery under regional anaesthesia.

Examination revealed a young lady with anterior neck swelling, not pale, anicteric, acyanosed, not dehydrated and no pedal oedema. The patient presented with a heart rate of 88 beats per minute, a respiratory rate of 20 breaths per minute, a blood pressure of 130/90 mmHg, and a temperature of 37.0 degrees Celsius. Examination revealed an anterior neck mass measuring approximately 8cm x 8cm. The mass extended more to the left than the right and was firm, nodular, and non-tender. There was no associated skin discoloration or warmth, and the mass was not attached to the overlying skin. The mass was palpable both above and

below. No tracheal deviation was noted. Cardiovascular and respiratory examinations were otherwise normal. Investigations, including a full blood count, electrolyte levels, urea and creatinine levels, and thyroid function tests, were all within the normal range. An electrocardiogram was also normal.

The patient had intermediate cervical plexus block done as per protocol and 300grams of thyroid tissue was removed. Patient was haemodynamically stable throughout the procedure with NRS score remaining 2 and below up to 4 hours post operatively (about 8 hours after block institution). Total surgery time was

Fig. 2: Appling gel on Ultrasound Probe

165 minutes. She was discharged home third day with no complication for postoperative follow up at the clinic.

CASE 3

OA, a 44-year-old female known hypertensive with a 2-year history of progressively enlarging anterior neck swelling. Swelling had been associated increasing difficulty with breathing. She has been on tabs nifedipine 20mg daily, moduretic 25mg daily and aspirin 75mg daily. There is associated daytime somnolence, dyspnea on exertion and features suggestive of obstructive sleep apnoea. Patient had significant phobia for general anaesthesia and declined surgery at the outpatient clinic. She, however, gave consent for surgery after being counselled for regional anaesthesia.

Examination revealed a middle-aged lady with huge anterior neck swelling, not pale, anicteric, acyanosed, not dehydrated and no pedal oedema. The patient presented with a heart rate of 96 beats per minute, a respiratory rate of 18 breaths per minute, a blood pressure of 150/90 mmHg, and a temperature of 36.7 degrees Celsius. A large anterior neck mass was evident, extending bilaterally into the lateral aspects of the neck. The mass was firm, nodular, and non-tender, with no associated skin discoloration or warmth. It was not attached to the overlying skin. While the mass was palpable superiorly, it was not palpable inferiorly. Substantial tracheal deviation to the right was noted. Cardiovascular and respiratory examinations were otherwise normal. Investigations, including a full blood count, electrolyte levels, urea and creatinine levels, and thyroid function tests, were all within the normal range. An electrocardiogram was also normal.

The patient had intermediate cervical plexus block done as per protocol and 375grams of thyroid tissue was removed. Patient was heamodynamically stable throughout the procedure with NRS score remaining 2 and below up to about 7hours after the performance of the block. Total surgery time is about 135minutes. She was subsequently discharged for follow up at the clinic.

CASE 4

OU, a 44year old female, with 9 years history of progressively enlarging anterior neck swelling, no history of voice change, heat or cold intolerance, although she occasionally had cardiac palpitation. No other toxic symptoms. There was history of difficulty in breathing especially with exertion and had also been treated for pulmonary TB at 9 years of age. No history of any comorbid conditions. She had her surgery postponed in the past due to suspected post TB pulmonary fibrosis.

At presentation, she was a middle-aged woman in mild respiratory distress, exhibiting nasal flaring. She appeared well-perfused with no pallor, jaundice, or cyanosis, and was not dehydrated. No pedal edema was observed. Examination of the head and neck revealed an anterior neck swelling that moved with swallowing. The swelling was non-tender, with no overlying skin discoloration. It was firm to palpation and could be examined both above and below. No differential warmth was noted, and the mass was not attached to the skin. The trachea remained in a central position. Chest examination revealed reduced chest excursion. Percussion of the chest was resonant, but air entry was globally reduced. Abdominal and cardiovascular examinations were unremarkable. Full blood count, electrolyte levels, urea and creatinine

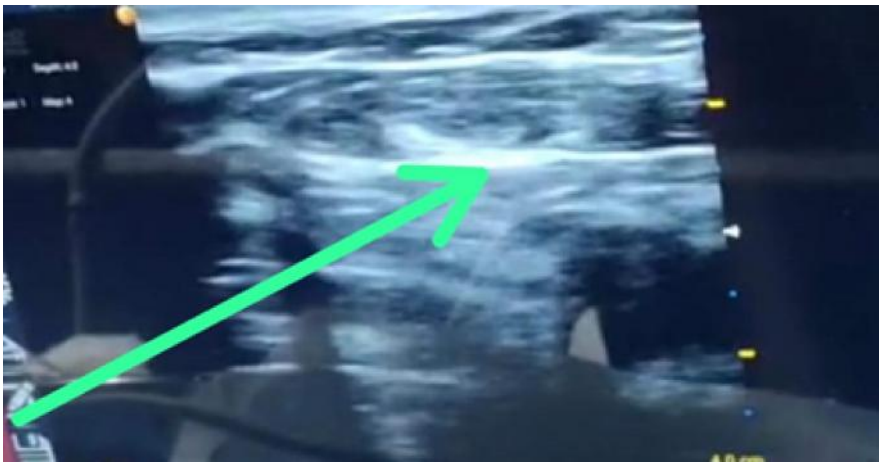

Fig. 3: The arrow pointed to posterior border of the sternocleidomastoid muscle

levels, and thyroid function tests were all within the normal range. Both an electrocardiogram and echocardiogram were normal. Chest CT scan done revealed diffuse central bronchiectasis with bronchial thickening and air trapping with differential diagnosis of willianm-campbel syndrome, allergic bronchopulmonary mycosis and atypical mycobacterial infection

She was counselled for regional anaesthesia due to her clinical condition and subsequently had the surgery done following the intermediate cervical plexus block protocol. The patient had intermediate cervical plexus block done as per protocol and 275grams of thyroid tissue was removed. Patient was heamodynamically stable throughout the procedure with NRS score remaining 2 and below up to 6 hours after the block was instituted. Total surgery time was about 195minutes. Patient was discharged about 3 days after surgery for follow up at the clinic.

Fig. 4: the Ultrasoud Probe on the left and introducer on the right hand

DISCUSSION

The use of ultrasound-guided bilateral subcutaneous cervical plexus block for total thyroidectomy in patients with difficult airway is discussed based on the presented case series. The conventional approach to thyroidectomy involves general anaesthesia due to desire for adequate muscle relaxation and concerns about airway management. Regional anaesthesia, specifically ultrasound-guided cervical plexus block, is explored as an alternative to eliminate the need for endotracheal intubation and improve postoperative analgesia.[5–7] General anaesthesia with endotracheal intubation is the most common anaesthetic technique for thyroidectomy. However, this can be challenging in patients with difficult airway. Difficult intubation rates in thyroid surgery are reported to be higher (5.3%) compared to the general surgical population (2.5%).[8]

Factors contributing to difficult airway in thyroid patients include large goitre, tracheal deviation or compression, history of previous neck surgery, and substernal extension of the thyroid gland.[9] These factors can make mask ventilation and intubation difficult, increasing the risk of failed intubation, hypoxia, and even cardiac arrest. The main factor for difficult intubation among the cases was large thyroid mass. Regional anaesthesia techniques, like cervical plexus block, have been proposed as alternatives to general anaesthesia. These techniques can provide adequate anaesthesia for thyroid surgery while avoiding the need for airway manipulation. A systematic review by Warschkow *et al.* concluded that regional anaesthesia

for thyroidectomy is feasible and may reduce postoperative pain and opioid consumption.[10] The use of ultrasound guidance has significantly improved the safety and efficacy of cervical plexus blocks. Ultrasound allows real-time visualization of nerves, vessels, and the spread of local anesthetic, reducing the risk of complications like intravascular injection or phrenic nerve palsy.[5]

We made the choice of subcutaneous cervical plexus block, which is considered safer than the deep cervical plexus block. Suri *et al.* compared these techniques and found that the subcutaneous block provided similar analgesia with a lower risk of complications.[10,12] Total thyroidectomy involves both lobes of the thyroid, necessitating bilateral anesthesia. A study by Eti *et al.* found that bilateral superficial cervical plexus block provided effective anaesthesia for thyroidectomy, with high patient satisfaction and reduced postoperative analgesic requirements. The patients in this case series were discharged between 2nd to 3rd day postoperative. They were satisfied with the outcome. Studies have shown positive outcomes with regional anaesthesia for thyroidectomy. Short hospital stays, reduced postoperative nausea and vomiting, and high patient satisfaction with cervical plexus blocks compared to general anaesthesia.[6.]

Despite the positive outcomes, the discussion acknowledges potential limitations like, the regional anaesthesia may not be suitable for all patients. Factors like patient anxiety, need for concomitant procedures, or very large goiters might necessitate general anaesthesia (Kim *et al.*). Additionally, cervical plexus blocks do not eliminate the need for airway management skills, as conversion to general anesthesia may be required. The success of the block is assessed based on sensory evaluations and the achievement of a surgical level of anaesthesia. Continuous monitoring during the procedure ensures patient safety, and adverse events are diligently recorded.

CONCLUSION

In conclusion, ultrasound-guided bilateral subcutaneous cervical plexus block is an effective alternate anaesthetic method for complete thyroidectomy, especially in patients with restricted airways. It provides benefits in terms of airway management, postoperative healing, and patient satisfaction. However, it should be used as part of a patient-centered, multidisciplinary approach that considers patient characteristics and surgical needs. As with any medical method, success is dependent on adequate patient selection, anaesthetist's expertise, and the ability to manage potential consequences. This approach is consistent with the trend in anesthesiology toward more individualized, risk-stratified care that improves patient outcomes.

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