Archives of Clinical and Experimental Surgery, 2023
VOL 12, NO. 07, PAGE 01-06

RESEARCH ARTICLE

Open Access

A Prospective, Comparative Study between Trans-Axillary and Trans-Oral Approaches to Endoscopic Thyroid Surgery at a Teaching Hospital in India

Arvind Ghanghoria, Bhavesh Bang, Amiya Ankit*
Department of General Surgery, Mahatma Gandhi Memorial Medical College, Indore, India

ABSTRACT

Objective: To assess the outcome between trans-oral and trans-axillary endoscopic hemithyroidectomy in terms of cosmesis and complications.

Methods: Prospective observational study with 30 patients, 15 of whom underwent trans-axillary while other 15 underwent trans-oral hemithyroidectomy. Inclusion criteria were solitary benign thyroid nodule, less than 4 cm in size and restricted to one lobe, requiring a hemithyroidectomy.

Results: Majority of the patients were female, with a nodule size between 2 cm-3 cm. The mean operating time was much higher in the trans-oral group. The trans-oral group had significantly lower pain score and drainage in the post-operative period, while the hospital stay was same in both groups at 5 days. Though the incidence of complications was much higher in the trans-oral group, most of the complications were rather minor and did not require any major intervention.

Conclusion: Both trans-oral and trans-axillary approaches to thyroid surgery are safe and the choice of technique should be based on the patient preference.

ARTICLE HISTORY
Received: 15-Jul-2023, Manuscript No. EJMACES-23-106416;
Editor assigned: 18-Jul-2023, PreQC No. EJMACES-23-106416 (PQ);
Reviewed: 02-Aug-2023, QC No. EJMACES-23-106416;
Revised: 09-Aug-2023, Manuscript No. EJMACES-23-106416 (R);
Published: 16-Aug-2023

Keywords
Thyroid surgery; Hemithyroidectomy; Remote-access; Trans-oral; Trans-axillary

Introduction

Thyroidectomy is one of the most common operations carried out by General Surgeons, Otorhinolaryngologists and Head and Neck Surgeons. While the open approach to thyroidectomy is considered the gold standard, there has been an interest in the endoscopic approach to thyroid since the first performance of endoscopic neck surgery for a Parathyroid adenoma at Cleveland Clinic in 1995 [1], Since the incidence of thyroid nodules, especially the benign nodules, is very high in general population and the disease is proportionately higher in the females, there has been an interest in approaches which place the scar away from the operative area in neck at sites hidden from the view.

There are many varied approaches to remote access thyroid surgery. Some utilise insufflation while others rely on retraction (gasless). These techniques can use different points of entries like the axilla (trans-axillary), Bilateral Axilla-Breast Approach (the BABA approach), the post auricular facelift approach, and the trans-oral approach. Robots are also frequently used for thyroidectomies when available. There is no universally acceptable endoscopic approach and different groups continue to use different approaches. Remote access thyroid surgery is cosmetically superior as it avoids a neck scar, but it entails a lot of tissue dissection and opening up of non-physiological spaces. There is also a long learning curve for surgeons performing these kinds of surgeries. Therefore, it is important to have a good selection of patients. Among variety of endoscopic approaches Trans-oral and Trans-axillary are the most practiced approaches.

The trans-oral approach, first described in 2014 [2], has recently gained popularity and interest in contrast to other remote-access approaches [3-5]. It requires a smaller tissue dissection for the creation of the working space than other approaches, due to the relatively short distance from the oral vestibular incisions to the thyroid gland. Trans-oral approach is a form of Natural Orifice Transluminal Endoscopic Surgery (NOTES) and is the true “scarless” thyroid surgery. It has been shown to have better cosmetic outcomes as compared to other techniques [6,7].

In this study we have compared two popular endoscopic approaches i.e., Trans-oral and Trans-axillary approach for remote access thyroid surgery, to assess outcomes and post-operative complications of both approaches. The literature search shows that such study has not been done in India previously.

Contact: Amiya Ankit, E-mail: amiyaankitansu@gmail.com

Materials and Methods

Study design

This was a prospective, comparative, observational study conducted in the Department of General Surgery, MGM Medical College, Indore, between April 2021 and September 2022. The study was approved by the Ethics and Scientific Review Committee of the Institute. Before surgery, patients received written information about personal data use and gave written consent for sharing their data.

A total of 30 patients underwent thyroid lobectomy (hemithyroidectomy) were divided into two groups, Group A, trans-axillary approach and group B, trans-oral approach, with each group comprising of 15 patients.

All patients had a single thyroid nodule, fulfilling the inclusion and exclusion criteria for the study. All patients underwent a high frequency Ultrasound of the neck along with an ultrasound guided Fine Needle Aspiration Cytology (FNAC) prior to the surgical procedure as part of the institutional protocol for evaluation of thyroid nodules. Results of FNAC were graded based on the Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) [8]. All patients included in the study had nodules in the Bethesda categories II-IV, requiring a thyroid lobectomy as part of initial management.

Patients with thyroid nodules are routinely evaluated in the outpatient department. Since the department performs remote access thyroid surgeries regularly, all patients requiring surgery are counselled regarding it. Based on patient's choice, they are planned for either open or endoscopic approach. The clinical data including age, gender, primary tumour size, operating time, total postoperative drainage volume, postoperative pain score, cosmetic effect and complications were recorded and analysed. Those patients, who required conversion to open approach intra-operatively, were excluded from the study.

The primary objectives of the study were as follows.

1. To compare the outcome between trans-axillary and trans-oral approaches
2. To compare duration of surgery and peri-operative blood loss
3. To compare the post-operative pain score
4. To compare post-operative complications

Statistical analysis was performed using the SPSS software. Continuous values were reported as mean ± Standard Deviation (SD). Differences in continuous variables were assessed by the student t-test. A p value of < 0.05 was considered statistically significant.

Inclusion criteria

1. Age 18-70 years
2. Solitary thyroid nodule, not involving the isthmus, requiring a thyroid lobectomy
3. Bethesda diagnostic categories II, III or IV
4. Nodule size ≤ 4 cm
5. Willing to participate in the study

Exclusion criteria

1. Patient refusal to participate in the study
2. Not fit for General Anesthesia
3. Patients on anticoagulant drugs or abnormal INR (International Normalised Ratio)
4. Patients with a history of thyroiditis
5. Patients with proven malignancy
6. Patients with previous neck surgery/irradiation
7. Patient taken for remote access surgery but converted to open approach
8. Patient lost to follow up before 1 month

The parameters evaluated in all 30 patients were as follows.

1. Age and gender
2. Size, number and site of nodules
3. Blood loss and duration of surgery (start of incision to last suture for port closure)
4. Intra-operative complications
5. Post-operative pain score on day 1, 5 and 21.
6. Post-operative voice change.
7. Post-operative hypocalcemia based on serum calcium performed on POD 1 and 3.

Operative technique

All patients received standard antibiotic prophylaxis. Patients who underwent surgery through trans-oral approach, were started on regular mouthwash with povidone iodine solution, before surgery, which was continued for at least 1 weeks after surgery. Patients who underwent surgery through trans-axillary route were intubated *via* orotracheal route while trans-oral patients were intubated *via* naso-tracheal route.

In trans-axillary approach, three ports were placed, two 5 mm ports with one on anterior axillary line and another circumareolar port, with a 10 mm port for camera in between the two ports on anterior axillary line (Figure 1).

For trans-oral route, the incisions for port were made in the oral vestibule, 1 cm above the junction of labial and alveolar mucosa. One 10 mm port was placed in midline, above the inferior labial frenulum, with two 5 mm working ports on either side of the midline (Figure 2).

Figure 1. Trans-axillary route.

Figure 2. Trans-oral route.

The surgery was performed in the standard fashion, using an ultrasonic scalpel (Harmonic Scalpel, Ethicon Endosurgery) for dissection. An attempt was made to identify and preserve the recurrent laryngeal nerve and both the parathyroid glands on ipsilateral side in all cases. Negative suction drains were placed in the operative bed at the end of the surgery and removed when the drainage amount was less than 30 cc.

Results

All surgeries were performed by a single surgeon. Majority of the patients were female, 86% in group A (trans-axillary) and 100% in group B (trans-oral), with the mean age of 32 ± 4 years (range 22 to 52 years) which was not statistically significant (p=0.64). Majority (60%) of the patients had nodule size between 2 cm-3 cm. The mean nodule size in group A was 2.9 cm ± 0.20 cm, while in group B, it was 2.6 cm ± 0.27 cm which was not statistically significant (p=0.29). The mean operative time in group A was 130 ± 20 minutes, while the mean operative time in group B was 170 ± 20 minutes. The operative time for trans-oral approach is remarkably higher than the trans-axillary route which achieved a statistical significance (p=0.0002) (Table 1).

Post-operative pain was assessed by the Visual Analogue Scale (VAS) on Post-Operative Day (POD) 1, day 5 and day 21. Patients operated by Trans-oral approach (group B) had less pain (average VAS: 3 ± 0.96) compared to trans-axillary approach (average VAS: 4 ± 0.70) on POD 1 which was statistically significant (p=0.004). This statistical significance was lost by POD 5 when average VAS score was 1 ± 0.35 in group A and 0 in group B. None of the patients in either group reported pain on POD 21 (Table 2).

Table 1. General information of the participants.

Variable	Group A (trans-axillary) n (%)	Group B (trans-oral) n (%)	Total n (%)
Gender			
Male	2	0	2
Female	13	15	28
Bethesda Category			
II	8	6	14
III	4	7	11
IV	3	2	5
Nodule Size			
<2 cm	2	3	5
2-3 cm	8	10	18
3-4 cm	5	2	7
Age			
<25 yrs.	4	4	8
25-35 yrs.	6	5	11
35-50 yrs.	4	6	10
>50 yrs.	1	0	1

Table 2. Post-operative complications.

Variable	Group A (trans-axillary) n (%)	Group B (trans-oral) n (%)	Total n (%)
Voice Change	0	0	0
Transient Hypocalcaemia (<4 weeks)	1	2	3
Persistent Hypocalcaemia (>4 weeks)	0	0	0
Wound Infection	1	0	1
Hematoma	1	0	1
Skin Perforation	1	2	3
Lower Lip Paraesthesia	0	3	3
Pneumothorax	0	0	0
Tracheal Injury	0	0	0
Seroma	0	0	0
Total	4	7	11

The mean total post-operative drainage in trans-axillary route was 87 ml ± 21.27 ml while in the trans-oral route was 33 ml ± 8.54 ml ($p<0.0001$). Trans-oral route has less total post-operative drainage, perhaps because of a shorter tissue dissection owing to the proximity of thyroid to oral vestibule.

The average duration of hospital stays for patients who had undergone surgery by either of the approaches was 5 ± 1.05 days. Our hospital being a public hospital, the hospital stay depends on many factors apart from post-operative recovery.

The most common intra-op complication observed was skin perforation in 3 (1 trans-axillary and 2 trans-oral group) patients. All cases needed additional suturing at the end of the procedure with 5/0 nylon suture and did not have any impact on final cosmesis.

In the post-operative period, transient hypocalcemia, requiring supplemental calcium, was observed in 3 patients (1 trans-axillary and 2 trans-oral cases). None of the patients developed persistent hypocalcemia. One patient in trans-axillary approach developed a hematoma in the sub-mammary space, which was treated conservatively. Another patient in the trans-axillary group had an infection of the 5 mm port, which was treated conservatively by antibiotics and drainage at bedside. Three patients (20%) in the trans-oral group complained of the paresthesia of the lower lip, a complication unique to the trans-oral group, because of involvement of the mental nerve.

Discussion

Through they have gained attention recently, remote access approaches to thyroid surgery are still performed at very few centres currently. Surgical robots are being increasingly used at centres where they are available. Our centre has been doing conventional remote access endoscopic thyroid surgery through trans-axillary and trans-oral route for many years now. There are very few studies which compare the two endoscopic approaches for thyroid surgery [9-12]. The incidence of transient hypocalcaemia in our study was 10%. There are wide variations in the reported incidence of hypocalcaemia after thyroid surgery, ranging from 0 to 46% of patients [13].

The operative time in our study was much higher in the transoral group, as compared to the trans-axillary group. This trend has been observed in many other previous studies, employing the conventional endoscopic as well as robotic approach. The initial part of the dissection in trans-oral approach in the submental region is blind, while in the trans-axillary approach, the dissection is entirely under vision. Also, the trans-oral approach is much different than both conventional open technique and other endoscopic/robotic approaches in the fact that the visualisation of thyroid is done in a craniocaudal axis as compared to transverse direction in all other approaches. This requires a slower approach to avoid complications [6,11].

The post-operative hospital stay in our study was 5 days, which is similar to that demonstrated by Yang et al. in their comparative study of 82 patients. Apart from clinical factors, the post-operative hospital stay is also dependent on many social factors.

Post-operative pain was significantly lower in the trans-oral group as compared to the trans-axillary group on Day 1. While the pain score reached equivalent levels in both techniques on POD 5. This has also been observed in previous study by Yang et al. The possible explanation for less pain in trans-oral group is related to less tissue dissection needed for reaching the thyroid gland. Post-operative drainage was significantly lower in the trans-oral approach in our study which is similar to the data reported in literature [12].

The overall complication rate for the entire series was 36.6% (26.6% for group A and 46.6% for group B). However, all the complications were Grade 1 as per the Clavien-Dindo Classification (09), not requiring any major intervention. None of the complications showed any statistical significance (p=1).

Conclusion

Endoscopic approaches to thyroid are technically challenging because of a long learning curve. Unlike conventional laparoscopic surgery, which is performed in the peritoneal cavity, thyroid gland is not surrounded by a potential space and any remote access thyroid surgery requires a potential space to be created, before thyroid gland can be reached. This makes remote access approaches to thyroid maximally invasive, unlike conventional laparoscopy which is minimally invasive.

In view of the limited availability of large-scale data, there are very few recommendations on the optimal technique for remote access thyroid surgery. In our experience, we found that the mean operative time was higher in the trans-oral approach.

Our cohort was rather small with a total of only 30 patients as the study was conducted during the COVID-19 pandemic, when elective surgeries were being deferred. Larger studies are needed to establish the superiority of one technique over the other.

References

[1] Gagner M. Endoscopic subtotal parathyroidectomy in patients with primary hyperparathyroidism. Br J Surg 1996;83(6):875.

[2] Wang C, Zhai H, Liu W, Li J, Yang J, Hu Y, et al. Thyroidectomy: A novel endoscopic oral vestibular approach. Surgery 2014;155(1):33-38.

[3] Kim HK, Chai YJ, Dionigi G, Berber E, Tufano RP, Kim HY, et al. Transoral robotic thyroidectomy for papillary thyroid carcinoma: Perioperative outcomes of 100 consecutive patients. World J Surg 2019;43:1038-1046.

[4] Anuwong A, Ketwong K, Jitpratoom P, Sasanakietkul T, Duh QY. Safety and outcomes of the transoral endoscopic thyroidectomy vestibular approach. JAMA Surg 2018;153(1):21-27.

[5] Razavi CR, Vasiliou E, Tufano RP, Russell JO. Learning curve for transoral endoscopic thyroid lobectomy. Otolaryngol Head Neck Surg 2018;159(4):625-629.

[6] Yang J, Wang C, Li J, Yang W, Cao G, Wong HM, et al. Complete endoscopic thyroidectomy *via* oral vestibular approach versus areola approach for treatment of thyroid diseases. J Laparoendosc Adv Surg Tech A 2015;25(6):470-476.

[7] Russell JO, Razavi CR, Al Khadem MG, Lopez M,

Saraf S, Prescott JD, et al. Anterior cervical incision-sparing thyroidectomy: Comparing retroauricular and transoral approaches. Laryngoscope Investig Otolaryngol 2018;3(5):409-414.

[8] Cibas ES, Ali SZ. The 2017 Bethesda system for reporting thyroid cytopathology. Thyroid 2017;27(11):1341-1346.

[9] Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240(2):205-213.

[10] Lee MC, Ahn J, Choi IJ, Lee BC, Ryu J. Comparative study of gasless transaxillary, bilateral axillo-breast, unilateral axillo-breast with carbon dioxide insufflation, retroauricular, and transoral vestibular endoscopic thyroidectomy approaches at a single institution: A retrospective analysis and lessons learned. Clin Exp Otorhinolaryngol 2022;15(3):283-291.

[11] Zheng G, Xu J, Wu G, Ma C, Sun H, Ge M, et al. Transoral versus gasless transaxillary endoscopic thyroidectomy: a comparative study. Updates Surg 2022;74(1):295-302.

[12] He Q, Zhu J, Li X, Wang M, Wang G, Zhou P, et al. A comparative study of two robotic thyroidectomy procedures: transoral vestibular versus bilateral axillary-breast approach. BMC Surg 2022;22(1):1-9.

[13] Mehanna HM, Jain A, Randeva H, Watkinson J, Shaha A. Postoperative hypocalcemia-the difference a definition makes. Head Neck 2010;32(3):279-283.