

## Outcomes of Per-oral Endoscopic Thyroidectomy (POET) – A New Trend for Scar-free Thyroidectomy

Yip Swee Yan\* and Yip Kok Thye

Department of general surgery, Hospital Lam Wah Ee, Malaysia

### \*Corresponding author

Miss Yip Swee Yan, No. 141, Jalan Tan Sri Teh Ewe Lim, Jelutong, 11600, George Town, Penang, Malaysia, Tel: +447393862822 (or) +6046528818; E-mail: yipsyan@yahoo.com.

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### Abstract

**Objectives:** This paper discusses the surgical outcomes of POET compared to open thyroidectomy (OT) and other approaches of video thyroidectomy (VT) such as chest or axillary approach to investigate the feasibility of POET as a safe alternative.

**Background:** Per-Oral Endoscopic Thyroidectomy (POET) is a developing novel technique based on the principles of minimally invasive surgery offering “scar-free” thyroidectomy. To date, results from various individual centers have been published internationally but none from UK, Malaysia or Singapore.

**Methods:** This is a single tertiary hospital, single surgeon based retrospective analysis of 98 selected patients (mean age: 43.5 years old) undergoing POET in 12 months (July 2017 to July 2018). It records the complication rates post-operatively until day of discharge.

**Results:** The average length of stay is 2 days and average time of operation is 69 minutes. There was no blood loss >100ml and no wound infection recorded among the 98 patients. Only 1 out of 98 patients (1%) had permanent recurrent laryngeal nerve (RLN) palsy. Clinical hypocalcemia described as cramp and lip paresthesia was experienced by 6 patients (6%). 5% had transient mental nerve injury described as mental paresthesia.

**Conclusion:** POET is a promising safe alternative technique to thyroidectomy with comparable surgical outcome yet significantly better cosmetic outcome. This technique has a strong potential to be useful when lowering the rate of developing keloidal scar and hypertrophic scarring. POET can be an option to offer patients who are especially driven to achieve perfect cosmesis.

**Keywords:** Natural Orifice Endoscopic Thyroidectomy, POET, Scar-Free, Thyroidectomy, TOETVA

### Introduction

Visible scars following conventional thyroidectomy and other approaches of video thyroidectomy such as those on the anterior neck, axillary and anterior chest is a cosmetic burden to patients especially in young females and those prone to keloidal and hypertrophic scarring. Studies have shown that thyroidectomy scars does indeed affect patient quality of life [1]. Per-oral endoscopic thyroidectomy (POET) is a developing novel technique based on principles of minimally invasive surgery offering “scar-free” thyroidectomy through an inner lower lip incision. It has a potential in future practices of thyroidectomy and may positively impact patients affected by scarring post-thyroidectomy.

To date, clinical results of POET from various individual centres have been published internationally such as in Thailand, Japan, Korea and Italy but none from United Kingdom, Australia, Malaysia

or Singapore. This paper presents the surgical outcomes focusing on complications rates following POET in a single centre. The aim is to investigate the feasibility of POET as a safe and better alternative to thyroidectomy. It will also describe the surgical techniques used for POET in this hospital.

### Patients and methods

This is a single tertiary hospital, single surgeon based retrospective analysis of 98 selected patients with a mean age of 43.5 years old (range 16-68 years old) undergoing POET in 12 months (July 2017 to July 2018). Data was collected from patient notes. It records the perioperative and post-operative complication rates similar to those experienced during conventional and other approaches of endoscopic thyroidectomy such as recurrent laryngeal nerve injury, hypocalcaemia, bleeding and infection post-operatively until day of discharge. It also measures time taken for surgery (minutes), length of admission (day), maximal pain score during admission (visual analogue scale). Additionally, the rate of mental nerve injury which is not usually found in other approaches were also recorded.

Permanent hypocalcaemia is defined as patients needing calcium and vitamin D supplements for more than 3 months. Recurrent laryngeal nerve injury is defined as the presence of hoarseness in the voice; mental nerve injury is defined as patient experiencing change in sensation to the chin or mental par aesthesia.

We included patients with diagnosis from ultrasound and/or correlating pathological findings of benign cyst, benign follicular adenoma or nodule, multinodular goitre, toxic goitre, thyroiditis (Hashimoto's and Lymphocytic) and early stage thyroid carcinoma (papillary and follicular) classified by the seventh edition UICC/AJCC staging system. Patients with size of lesion exceeding 10cm in either dimensions (length, width or height) on ultrasound neck were excluded. Patients were not selected if they were not suitable for general anaesthesia or unfit for surgery. Average BMI recorded was  $23.4 \text{ kgm}^{-2} \pm 4.75$  (normal). 6 patients has a history of diabetes mellitus.

**Study Protocol:** Post-operatively, all patient was prescribed with antibiotics for 5 days and antiseptic mouthwash. Serum calcium levels were recorded post-operatively for patients receiving total thyroidectomy and subsequent oral or intravenous calcium supplements were prescribed if patient complains of paraesthesia or if serum calcium levels were less than 2.1mmol/L on day 1 (Normal range: above 2.1mmol/L). Patients were allowed sips of fluid immediately post-op and liquid diet was commenced on day 1 post-op.

Follow up appointments were arranged 2 weeks and 2 months post-operatively which included wound inspection, clinical examination for hypocalcaemia, and reassessment of serum calcium and thyroxine levels.

**Operative techniques:**

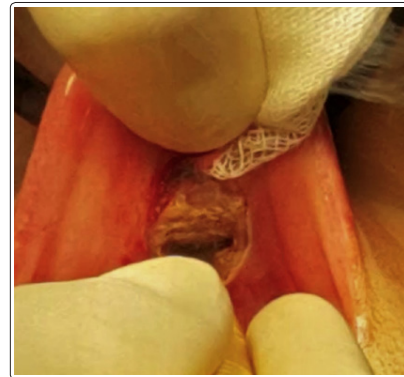
POET has been described by Angkoon [2]. A slight variation in his technique was performed in these 98 patients.

In summary,

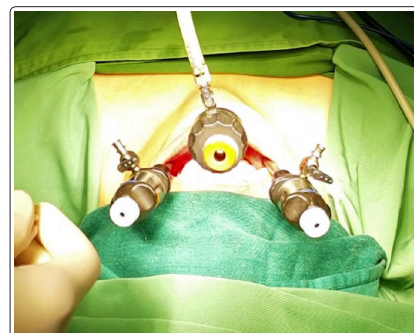
1. Patients were given general anaesthesia through nasotracheal intubation.
2. Patient is positioned supinely with neck extension by placing sandbags under both shoulder blades.
3. The surgeon is positioned at head-end for easier access of the three-port laparoscope.
4. The oral cavity is disinfected with 0.05% Hibitane pre-operatively.
5. A 10mm incision is made at the above the frenulum of the lower lip, and two 5mm lateral incisions at most lateral part of lower lip.
6. A 10mm trocar was inserted for a 10mm 30° laparoscope. Two 5mm trocar were inserted laterally.
7. The CO<sub>2</sub> insufflation pressure was set at 6mmHg.
8. Dissect the plane between the deep cervical fascia and strap muscles (SM) from thyroid glands until the suprasternal notch.
9. SMs were divided by cutting at the midline raphe to expose the thyroid gland.
10. Thyroid isthmus was dissected to expose the trachea.
11. The upper pole is dissected and the superior thyroid artery, and veins were identified and cut using an energy device (Harmonic scalpel).
12. Sutures were used to retract SM laterally for better exposure of thyroid gland.

13. Recurrent laryngeal nerve and parathyroid glands were identified and the thyroid lobectomy performed.
14. Insert a plastic bag to remove resected thyroid gland.
15. 1 redivac inserted at lateral neck.
16. Three oral vestibule incisions were closed using absorbable sutures. (vincryl 3.0).
17. Patient discharged when redivac removed.

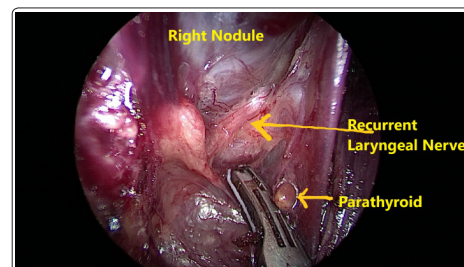
**Illustration:**



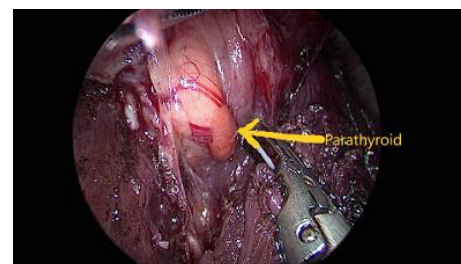
**Figure 1:** Central incision



**Figure 2:** Trocar position



**Figure 3:** Identification of recurrent laryngeal nerve and surrounding landmarks



**Figure 4:** Identification of parathyroid glands



**Figure 5:** “scar-free” 2 weeks post-operatively

## Results

**Table 1: Demographics of study group**

	Results
Benign/carcinoma (cases)	84/14
Bilateral/Unilateral (people)	56/42
Age (years) (range 16 - 68 years old)	43.5 ± 13.7
Mean size (cm) on USG neck	4.7 ± 1.75

**Table 2: Results of study showing operative time, length of stay and post-operative complication rate of 98 patients following POET surgery until the day of discharge”**

	Results
Average time of operation (minutes)	68.8 ± 23.1
Average length of stay post-operatively (days)	2 ± 0.5
Permanent recurrent laryngeal nerve palsy	1%
Transient mental nerve injury	5%
Permanent mental nerve injury	0%
Clinical hypocalcaemia	6%
Post-operation day 1 hypocalcaemia (<2.1mmol/L)	16%
Permanent hypocalcaemia	1%
Conversion to open thyroidectomy	1%
Pain (visual analogue score) (Range 0-10)	2 out of 10
Infection	0%
Hematoma	2%

This study had a total of 98 patients. There were 42 patients receiving unilateral thyroidectomy and 56 patients receiving bilateral thyroidectomy.

We operated on 51 (52.0%) cases of multinodular goitre, 14 (14.3%) cases of thyroid carcinoma; 27 (27.6%) benign thyroid lesion with a nature of either benign cyst, benign follicular adenoma or benign nodule; and 6 (6.1%) cases of thyroiditis (Hashimoto or Lymphocytic).

The average size of lesion measured at either maximal length, height or width dimension on ultrasound neck was 4.7cm ± 1.75 (range 1.5cm-9.4cm). The average time of operation was 68.8 minutes ± 23.1. The average length of stay was 2 days ± 0.5. There was no wound infection (0%) recorded among the 98 patients.

Only 1 out of 98 patients (1%) had permanent recurrent laryngeal nerve palsy. Transient mental nerve injury was experienced by 5

patients (5%). None (0%) of the patients had permanent mental nerve injury. Clinical hypocalcaemia was experienced by 6 patients (6%). Post-op day-1 hypocalcaemia was recorded in 16 patients (16%). There was one patient with permanent hypocalcaemia (1%).

One (1%) patient converted to open thyroidectomy. The mean for maximal pain using the visual analogue scale (VAS) during admission was 2 ± 2.8 (range 0-10) amongst the 98 patients. 2 patients (2%) had a post-op hematoma.

## Statistics and design

All values were expressed as mean ± SD and data processed with Windows excel.

## Discussion

There has been evidence describing thyroidectomy since 1170, however thyroidectomies performed before 1850's had a high mortality rate due to haemorrhage, asphyxia and air embolism [3,4].

The golden age of thyroidectomy only began in the 19th century, when anaesthesia, antiseptic and haemostasis with instruments such as the Spencer Wells' forceps were jointly utilised [3,5,6]. During this period, Theodor Kocher, who is now widely regarded as the Father of Thyroid Surgery, introduced the technique of extracapsular dissection. By the end of his career, Kocher presented the results of 5 000 successful cases of transverse-collar incision open total thyroidectomies in Berne Switzerland. His results demonstrated his success in reducing the mortality rate of thyroidectomies from 40% to 0.5% [4]. For his contributions in thyroid surgery Kocher was awarded the Nobel Prize in Medicine in 1909 and more importantly his technique has remained the technical basis of thyroid surgery until today.

MITS (minimal access thyroid surgery) or MIVAT (minimally invasive video assisted thyroidectomy) was a technique pioneered by Gagner et al, Micolli et al and Hüscher in the late 90's. It is categorised into cervical or extra-cervical i.e. breast, anterior chest, axillary or axillary bilateral breast approach [7-22]. In Korea, robot-assisted neck dissection (TORTVA) with trans-axillary or retro-auricular approach were demonstrated [23-25]. Both techniques minimised the length of incision and lessened tissue trauma with the use of endoscopes.

Today, the evolution of thyroidectomy has taken advantage of natural orifices, whereby aesthetic perfection can be achieved by hiding scars in anatomically obscured areas such as the inside of the lower lip. NOTES (natural orifice endoscopic thyroid surgery) was first developed by Witzel et al. in 2008 [26-32]. They experimented this concept on porcine models and human cadavers. Incisions were made sublingually in order to obscure obvious scarring. Now, POET or trans-oral-vestibule endoscopic thyroidectomy has been increasingly recognised and accepted as various international centres have published their results [33-44]. A. Angkoon has the largest existing series to date with 465 cases reported. He regards POET as TOETVA (trans-oral endoscopic thyroidectomy vestibular approach) in all his studies [45]. In this study, it was found that the cranio-caudal view of dissection in POET allows for easier identification of important surgical landmarks such as the recurrent laryngeal nerve and parathyroid glands. The rate of permanent Recurrent laryngeal nerve (RLN) injury was 1% and rate of transient hypocalcaemia was 6%. Only 1 patient had permanent hypocalcaemia. Literature studying the results of endoscopic thyroidectomy as compared to open thyroidectomy

has been published in various centres. They reported the rate of transient RLN injury in open thyroidectomies (OT) ranged between 2.11% and 11.8%, whereas the rate of permanent RLN injury in OT ranged between 0.2% and 5.9%. They reported the rate of transient and permanent RLN injury in video thyroidectomies (VT) to be 0-6% and <1% respectively [46,47].

The ample working space allowed better manual dexterity without much mutual collision. This helped in better bleed control and lessening of tissue trauma. There was one patient that was converted to open thyroidectomy due to excessive bleeding. In the remaining 97 patients studied, there were none that had blood loss of more than 100mls. The results are reproducible as in a systemic review, the rate of conversion to open thyroidectomy reported was 1.9 % and the median blood loss reported was 35.5mls [48].

Tissue trauma was slightly reduced as compared to conventional and other approaches of thyroidectomy. Post-operatively, our patients reported pain scores accessed with the visual analogue scale of 2 out of 10. In most patients, the pain was described as mild and tolerable. This score is marginally lower than that reported from conventional and other endoscopic approaches of thyroidectomy [46,49].

An important added complication from POET is mental nerve injury. In this study, 5% of patients had experienced transient mental paraesthesia but none (0%) remained permanent. This data was reproducible and reported in various other centres [48]. The rate of mental nerve injury can be reduced if lateral incisions are positioned more lateral and closer to the lower lip as suggested by Angkoon who reported mental nerve injury in his series of 425 patients to be 0.7 % [45].

The benefits of POET is that this technique allows for both bilateral thyroidectomy and unilateral thyroidectomy. This proves more superior to endoscopic thyroidectomy via axillary approach in terms of accessibility to the thyroid gland. For example, endoscopic thyroidectomy by axillary approach only allows unilateral access and will require bilateral approach for bilateral thyroidectomies to be done. In the future, there is potential for this operation to replace other approaches as it can allow one-time dissection. POET can also be successfully applied in cases of early-stage thyroid carcinoma i.e. papillary or follicular carcinoma.

Patients were prescribed with a course of antibiotics and antiseptic mouthwash post-operatively. So far for our first 98 cases, no infections were documented.

The time taken for operation is longer as compared to conventional thyroidectomy [46]. However, our author suggest that it might be a worthwhile investment in exchange for better cosmetic outcome and patient satisfaction. Other large centre studies have reported an operation time of 100.8 minutes and 119.9 minutes [48,49]. The average length of stay (2 days) is the similar to that of other approaches of endoscopic thyroidectomies.

The limitations of POET is a gland size more than 10cm or the presence of extensive retrosternal extension. Through this study, we found that gland size was the most valuable determining factor for patient's suitability to undergo POET. However, more in-depth studies need to be conducted to define the suitable patient criteria for POET.

## Conclusion

POET is a promising, safe alternative technique to thyroidectomy. It provides significantly better cosmesis with comparable surgical outcomes. This technique has a strong potential to be useful when lowering the rate of developing keloidal scar and hypertrophic scarring. It can be an option to offer patients who are especially driven to achieve perfect cosmesis.

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## References

1. Choi Y, Lee JH, Kim YH, Lee YS, Chang HS, et al. (2014) Impact of postthyroidectomy scar on the quality of life of thyroid cancer patients. *Ann Dermatol* 26: 693-699.
2. Anuwong A, Vix M, Wu H (2017) peroral endoscopic thyroidectomy (POET), a novel pioneering technique. *websurg.*
3. Sarkar S, Banerjee S, Sarkar R, Sikder B (2016) A Review on the History of 'Thyroid Surgery'. *Indian J Surg* 78: 32-36.
4. Becker WF (1977) Presidential address: Pioneers in thyroid surgery. *Ann Surg* 185: 493-504.
5. Lister JB (1910) *The Collected Papers of Joseph, Baron Lister.* Oxford: Clarendon Press.
6. Harvey SC (1929) The history of hemostasis. : *British journal of surgery* 2: 167-168.
7. Gagner M (1996) Endoscopic subtotal parathyroidectomy in patients with primary hyperparathyroidism. *Br J Surg* 83: 875.
8. Miccoli P, Berti P, Conte M, Bendinelli C, Marcocci C (1999) Minimally invasive surgery for thyroid small nodules: preliminary report. *J Endocrinol Invest* 22: 849-851.
9. Miccoli P, Elisei R, Materazzi G, Capezzone M, Galleri D, et al. (2002) Minimally invasive video-assisted thyroidectomy for papillary carcinoma: a prospective study of its completeness. *Surg Endosc* 16: 1070-1073.
10. Miccoli P, Berti P, Materazzi G, Minuto M, Barellini L (2004) Minimally invasive video-assisted thyroidectomy: five years of experience. *J Am Coll Surg* 9: 243-248.
11. Miccoli P, Materazzi G (2004) Minimally invasive, video-assisted thyroidectomy (MIVAT). *Surg Clin North Am* 84: 735-741.
12. Miccoli P, Biricotti M, Matteucci V, Ambrosini CE, Wu J, et al. (2016) Minimally invasive video-assisted thyroidectomy: reflections after more than 2400 cases performed. *Surg Endosc* 30: 2489-2495.
13. Hüscher CS, Chiodini S, Napolitano C, Recher A (1997) Endoscopic right thyroid lobectomy. *Surg Endosc* 11: 877.
14. Shimizu K, Akira S, Tanaka S (1998) Video-assisted neck surgery: endoscopic resection of benign thyroid tumor aiming at scarless surgery on the neck. *J Surg Oncol* 69: 178-180.
15. Ikeda Y, Takami H, Sasaki Y, Takayama J, Kurihara H (2004) Are there significant benefits of minimally invasive endoscopic thyroidectomy? *World J Surg* 28:1075-1078.
16. Benhidjeb T, Anders S, Bärlehner E (2006) Total video-endoscopic thyroidectomy via axillo-bilateral-breast-approach (ABBA). *Langenbecks Arch Surg* 391: 48-49.
17. Takami H, Ikeda Y (2002) Minimally invasive thyroidectomy. *ANZ J Surg* 72: 841-842.
18. Ikeda Y, Takami H, Niimi M, Kan S, Sasaki Y, Takayama J (2001) Endoscopic thyroidectomy by the axillary approach. *Surg Endosc* 15: 1362-1364.
19. Chand G, Mishra S, Kumar A, Vimal S (2017) Endoscopic

- Thyroidectomy: Experience of Breast and Axillary Approach. *Journal of universal surgery* 5: 5.
20. Barlehner E, Benhidjeb T (2008) Cervical scarless endoscopic thyroidectomy: Axillo-bilateral-breast approach (ABBA). *Surg Endosc* 22: 154-157.
  21. Kwon H, Koo dH, Choi JY, Kim E, Lee KE, et al. (2013) Bilateral axillo-breast approach robotic thyroidectomy for Graves' disease: an initial experience in a single institute. *World J Surg* 37: 1576-1581.
  22. Li ZY, Wang P, Wang Y, Xu SM, Cao LP, et al. (2010) Endoscopic thyroidectomy via breast approach for patients with Graves' disease. *World J Surg* 34: 2228-2232.
  23. Lee J, Chung WY (2013) Robotic surgery for thyroid disease. *Eur Thyroid J* 2: 93-101.
  24. Byeon HK, Ban MJ, Lee JM, Ha JG, Kim ES, Koh, et al. Robot-assisted Sistrunk's operation, total thyroidectomy, and neck dissection via a transaxillary and retroauricular (TARA) approach in papillary carcinoma arising in thyroglossal duct cyst and thyroid gland. *Ann Surg Oncol* 19: 4259-4261.
  25. Ban MJ, Chang JW, Kim WS, Byeon HK, Koh YW, et al. (2016) Minimal Endoscope-assisted Thyroidectomy Through a Retroauricular Approach: An Evolving Solo Surgery Technique. *Surg Laparosc Endosc Percutan Tech* 26: e109-e112.
  26. Witzel K, von Rahden BH, Kaminski C, Stein HJ (2008) Transoral access for endoscopic thyroid resection. *Surg Endosc* 22: 1871-1875.
  27. Witzel K, Hellinger A, Kaminski C, Benhidjeb T (2016) Endoscopic thyroidectomy: the transoral approach. *Gland Surg* 5: 336-341.
  28. Wang Y, Xie QP, Yu X, Xiang C, Zhang ML, et al. (2017) Preliminary experience with transoral endoscopic thyroidectomy via vestibular approach: a report of 150 cases in a single center]. *Zhonghua Wai Ke Za Zhi* 55: 587-591.
  29. Sivakumar T, Amizhthu RA (2018) Transoral endoscopic total thyroidectomy vestibular approach: A case series and literature review. *J Minim Access Surg* 14: 118-123.
  30. Karakas E, Anuwong A, Ketwong K, Kounnamas A, Schopf S, et al. (2018) [Transoral thyroid and parathyroid surgery : Implementation and evaluation of the transoral endoscopic technique via the vestibular approach (TOETVA)]. *Chirurg* 89: 537-544.
  31. Pan JH, Zhou H, Zhao XX, Ding H, Wei L, et al. (2017) Robotic thyroidectomy versus conventional open thyroidectomy for thyroid cancer: a systematic review and meta-analysis. *Surg Endosc* 31: 3985-4001.
  32. Wilhelm T, Wu G, Teymoortash A, Güldner C, Günzel T, et al. (2016) Transoral endoscopic thyroidectomy: current state of the art—a systematic literature review and results of a bi-center study. *translational cancer research* 5.
  33. Anuwong A (2016) Transoral Endoscopic Thyroidectomy Vestibular Approach: A Series of the First 60 Human Cases. *World J Surg* 40: 491-497.
  34. Nakajo A, Arima H, Hirata M, Mizoguchi T, Kijima Y, et al. (2013) Trans-Oral Video-Assisted Neck Surgery (TOVANS). A new transoral technique of endoscopic thyroidectomy with gasless premandible approach. *Surg Endosc* 27: 1105-1110.
  35. Le QV, Ngo DQ, Ngo QX (2018) Transoral endoscopic thyroidectomy vestibular approach (TOETVA): A case report as new technique in thyroid surgery in Vietnam. *Int J Surg Case Rep* 50: 60-63.
  36. Udelsman R, Anuwong A, Oprea AD, Rhodes A, Prasad M, et al. (2016) Trans-oral Vestibular Endocrine Surgery: A New Technique in the United States. *Ann Surg* 264: e13-e16.
  37. Dionigi G, Bacuzzi A, Lavazza M, Inversini D, Boni L, et al. (2017) Transoral endoscopic thyroidectomy: preliminary experience in Italy. *Updates Surg* 69: 225-234.
  38. Dionigi G, Lavazza M, Wu CW, Sun H, Liu X, et al. (2017) Transoral thyroidectomy: why is it needed? *Gland Surg* 6: 272-276.
  39. Anuwong A, Kim HY, Dionigi G (2017) Transoral endoscopic thyroidectomy using vestibular approach: updates and evidences. *Gland Surg* 6: 277-284.
  40. Yi JW, Yoon SG, Kim HS, Yu HW, Kim SJ, et al. (2018) Transoral endoscopic surgery for papillary thyroid carcinoma: initial experiences of a single surgeon in South Korea. *Ann Surg Treat Res* 95: 73-79.
  41. Müller V, Mogl M, Seika P, Jöns T, Sauer I, et al. (2018) How I Do It: New Dissector Device Allows for Effective Operative Field in Transoral Endoscopic Thyroid Surgery Using Vestibular Approach. *Surg Innov* 2018:1553350618785281.
  42. Dionigi G, Chai YJ, Tufano RP, Anuwong A, Kim HY (2018) Transoral endoscopic thyroidectomy via a vestibular approach: why and how? *Endocrine* 59: 275-279.
  43. Chen Y, Chomsky-Higgins K, Nwaogu I, Seib CD, Gosnell JE, et al. (2018) Hidden in Plain Sight: Transoral and Submental Thyroidectomy as a Compelling Alternative to “Scarless” Thyroidectomy. *J Laparoendosc Adv Surg Tech A*.
  44. Dionigi G, Lavazza M, Pappalardo V, Inversini D, Wu C-W, et al. (2019) Transoral endoscopic thyroidectomy vestibular approach (TOETVA) or open thyroidectomy: a prospective randomised trial to compare length of stay and postoperative pain. *world congress of thyroid cancer; rome, italy: thyroid world congress*.
  45. Anuwong A, Ketwong K, Jitpratoom P, Sasanakietkul T, Duh QY (2018) Safety and Outcomes of the Transoral Endoscopic Thyroidectomy Vestibular Approach. *JAMA Surg* 153: 21-27.
  46. Jitpratoom P, Ketwong K, Sasanakietkul T, Anuwong A (2016) Transoral endoscopic thyroidectomy vestibular approach (TOETVA) for Graves' disease: a comparison of surgical results with open thyroidectomy. *Gland Surg* 5: 546-552.
  47. Li Y, Zhou X (2016) Comparison between endoscopic thyroidectomy and conventional open thyroidectomy for papillary thyroid microcarcinoma: A meta-analysis. *J Cancer Res Ther* 12: 550-555.
  48. Shan L, Liu J (2018) A Systemic Review of Transoral Thyroidectomy. *Surg Laparosc Endosc Percutan Tech* 28: 135-138.
  49. Chai YJ, Song J, Kang J, Woo JW, Song RY, et al. (2016) A comparative study of postoperative pain for open thyroidectomy versus bilateral axillo-breast approach robotic thyroidectomy using a self-reporting application for iPad. *Ann Surg Treat Res* 90: 239-245.

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