

# **The 18th Congress of the Asian Association of Endocrine Surgeons—AsAES 2023**

## **Oral Abstract**

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Hitotsubashi Hall

Congress President: Takahiro Okamoto

Tokyo Women's Medical University

### FP-1-1

#### **Transoral Endoscopic vs Open Thyroidectomy: Comparative study of surgical outcome & QOL from India**

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**Background:** Several remote access approaches for endoscopic thyroid surgery is being practiced in different part of the world. The Transoral Endoscopic thyroidectomy through vestibular approach (TOETVA) demonstrated a new technique of total scar-free midline approach for both lobes of the thyroid with minimal dissection and optimum cosmetics.

**Aims & Objective:** The objective of this study is to assess the surgical outcome, cosmetic satisfaction, and quality of life after TOETVA in comparison to conventional open thyroid surgery.

**Method:** This is a prospective non-randomized study of 61 patients operated by a single surgeon at a tertiary care referral center in north India. We have selected the small benign thyroid nodule for this study from July 2021 to Jun 2022. 31 patients were enrolled in the TOETVA group and 30 patients in the open group during this duration. All patients were evaluated before a surgery and two weeks and four weeks after surgery for their quality of life using Thy-pro questionnaire and other post-surgical outcomes with a specific questionnaire.

**Results:** Total 61 patients were evaluated during this study period. The patients in the TOETVA groups are significantly younger than patients in the open surgery group [1.87 years younger(25.8%)]. The mean tumor size overall 2.94cm ( TOETVA 2.62cm & Open 3.25cm ) and the majority were benign STN in both the group, The mean operating time was 30% longer in the TOETVA group (150 mins ) than that in the conventional open surgery group (105mins) with p less than 0.05. The cost was significantly higher p less than 0.05 in TOETVA group. Hospital Stay was lower in TOETVA group, Cosmetic and overall satisfaction were significantly greater in the TOETVA group p less than 0.05. The Thyo-Pro QOL scores of the patients in TOETVA group were generally better than open surgery group.

**Conclusions:** The TOETVA is a safe and cost-effective approach for thyroid surgery with comparable complication rates for small thyroid tumors. The postoperative quality of life, cosmetic perception, and over all satisfaction was better than conventional open thyroid surgery.

### FP-1-2

#### **Swallowing Related Quality of Life in Endoscopic Thyroid Surgery Vs Open Thyroid Surgery**

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**Introduction:**

Surgical indication of thyroid surgery in small benign nodules is cosmesis. To improve the cosmesis, transoral endoscopic thyroid surgery (TOETVA) is considered one of the best modalities as it gives no visible scar. However, swallowing related quality of life (SWAL QoL) after TOETVA has not been compared with open thyroid surgery (OTS). The aim of this study is to compare the two modes of surgical therapy on swallowing related quality of life.

**Methods:**

This case control study was conducted prospectively between Sept 2020 and May 2022. Patient operated for benign euthyroid nodules undergoing either OTS or TOETVA were included in the study. Swallowing related quality of life was evaluated before and after the surgery and compared for the two groups.

**Results:**

Thirty-four patients underwent TOETVA and 76 had OTS. Out of 90 OTS patients, 40 age and sex matched cohort was selected as control. Pre-surgery scores were comparable between the two groups. Postoperatively, short term (1 month) SWAL-QoL was significantly better in TOETVA group as compared to OTS. However, long-term (3 months) SWOL-QoL was comparable in both groups.

**Conclusion:**

TOETVA results in significant improvement in short-term swallowing related QoL. However, long term SWAL-QoL is same as open thyroid surgery.

**FP-1-3**

**Tranoral robotic thyroidectomy vs transoral endoscopic thyroidectomy vestibular approach**

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Comparison between TORT and TOETVA

**Background:** The transoral endoscopic thyroidectomy vestibular approach (TOETVA) and transoral robotic thyroidectomy (TORT) have been an important way of thyroidectomy in recent years that have no scar on the neck with few complications. In this study, we compared TORT and TOETVA in patients with papillary thyroid cancer.

**Methods:** From January 2019 to April 2022, we retrospectively compared 100 consecutive TORT cases and 300 TOETVA cases. We investigated patient characteristics, pathologic findings, and clinical outcomes including total operative time.

**Results:** There were no significant differences between the two groups in terms of op time. The op time of TORT and TOETVA showed the similar results at 82.3min and 81.4m (P = 0.784). The median number of retrieved lymph nodes for TORT and TOETVA were 2.82 and 2.89. (P = 0.833), and the median number of retrieved metastatic lymph nodes (positive lymph nodes) for TORT and TOETVA were 0.74 and 0.40. (P = 0.056). The median days of POD for TORT and TOETVA were 2.39 and 2.54. (P = 0.091).

**Conclusions:** In this single center study, we found that TORT have no difference from TOETVA about op time and retrieved lymph nodes. In terms of lymph node and POD, TORT has a similar number of retrieved metastatic lymph nodes and PODs with TOETVA.

**Key Word:** TORT, TOETVA

**FP-1-4**

**Survey results compare transoral thyroidectomy to open thyroidectomy**

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Survey after transoral and open thyroidectomy

**Background:** The number of patients who undergo Transoral thyroidectomy has been increased with the recent progress in thyroid surgery techniques and the increasing number of patients concerned about cosmetics. This study plans to compare TOET survey results to Open thyroidectomy and find out if there is any difference between 2 groups.

**Methods:** From August 2021 to January 2022, 100 patients who underwent thyroidectomy performed by a single surgeon at Gangnam Severance Hospital were enrolled in this study. Before and after surgery, the HADS, PCS, QoR-15, PCL surveys were done. The patients with insufficient survey result were excluded from the study.

**Results:** The HADS-Anxiety score of TOET and open thyroidectomy was  $7 \pm 1.032$  and  $7.67 \pm 0.72$  (P value = 0.320). The HADS-Depression score of TOET and open thyroidectomy was  $4.22 \pm 0.781$  and  $5.74 \pm 0.766$  (P value < 0.05). The PCS score of TOET and open thyroidectomy was  $10.5 \pm 3.504$  and  $10.41 \pm 1.906$  (P value = 0.773). The QoR POD#0 score of TOET and open thyroidectomy was  $126.75 \pm 5.908$  and  $129.2 \pm 3.876$  (P value = 0.523). The QoR POD#1 score of TOET and open thyroidectomy was  $86.02 \pm 6.885$  and  $89.14 \pm 6.415$  (P value = 0.504). The QoR POD#2 score of TOET and open thyroidectomy was  $110.75 \pm 6.253$  and  $112.94 \pm 6.136$  (P value = 0.597). The PCL score of TOET and open thyroidectomy was  $10.27 \pm 3.103$  and  $9.14 \pm 2.076$  (P value = 0.545).

**Conclusions:** There was no difference between the results of TOET survey and open thyroidectomy survey except HADS-Depression. From these results, the post-operative stress about pain and the degree of recovery that patients feel after the surgery are similar between TOET and open thyroidectomy.

**Key Word:** Survey, Transoral thyroidectomy, Open thyroidectomy,

### FP-2-1

#### Starting TOETVA Service in a Low Resource Setting: Initial Experience from a LMIC

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##### Introduction:

Transoral endoscopic thyroidectomy via vestibular approach (TOETVA) is an advanced endoscopic surgery and only a handful of centers in India are offering it on a regular basis. Most of these centers are located in metro cities of India having standard endoscopic facilities. We want to share our experience of performing TOETVA procedures with minimal resources in a public sector hospital.

##### Methods:

We reviewed and documented the adaptations with regards to equipment and consumables in setting up our service. We also reviewed all TOETVA surgeries performed between January 2020 to January 2022.

##### Results:

TOETVA services were started in January 2020 after joining of an endocrine surgeon on staff. As ours is a low resource setting, many modifications were done to utilize the existing infrastructure for TOETVA. Availability of CO<sub>2</sub> cylinders is sometimes an issue. Hence, some parts of surgery were performed in a gasless way. We use 10 mm suction-irrigation instrument for subplatysmal flap creation. Intravenous catheter cannula was fashioned for lateral muscle retraction [Figure-1]. We do not have IONM. As endoscopic specimen retrieval bags are costly, hand gloves were used for specimen retrieval.

Total 24 hemithyroidectomies were performed during the study period. Two patients required conversion to open surgery (conversion rate 12.5%). Average operative time was 180 minutes. None of the patients had recurrent laryngeal nerve injury. Two patients had post-operative seroma which required aspiration. There was no other complication.

##### Conclusion:

Our results showed that our TOETVA setup is functional and sustainable.

### FP-2-2

#### Single-port transaxillary robotic thyroidectomy (START): 500-cases with two-step retraction method

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**Purpose:** This study aims to report the results of a pioneering clinical study using the Single port transaxillary robotic thyroidectomy (START) for 500 patients with thyroid tumour and to introduce our novel two step retraction method.

**Methods:** START was performed on consecutive 500 patients using the da Vinci Single Port (SP) robot system from January 2019 to January 2022 at the Yonsei University Health System, Seoul, Korea. The novel two step retraction technique, in which a 3.5 cm long incision was made along the natural skin crease, was used for the latter 464 patients. Surgical outcome and invasiveness of SP two step retraction method were analysed.

**Results:** The 500 patients who underwent START were 13–62 years old with body mass indices ranging from 15.3–37.4 kg/m<sup>2</sup>. Among them, thyroid malignancy accounted for 95% (476 cases) while thyroid benign nodule accounted for 5% (24 cases). The operations included 417 cases of thyroid lobectomy, 81 cases of total thyroidectomy, and 2 cases of completion thyroidectomy. All of the operations were performed successfully without any open conversions. The mean operative time for thyroid lobectomy with the two step retraction method was 112.0 ± 21.1 min, which was similar to that in the conventional gasless method (115.3 ± 17.3 min). The extent of flap dissection was minimized with the two step retraction method.

**Conclusions:** START is a practical surgical method with minimal invasiveness, particularly when the two step retraction method is employed. This method offers cosmetic and functional benefits to patients and reduces the workload fatigue of surgeons.

**FP-2-3**

**Endoscopic Thyroidectomy: Experience of More Than Three Hundred Cases from North India**

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**Introduction:** Endoscopic surgery for thyroid diseases has been cosmetically demanded by patients for the last two decades. It has led surgeons to innovate many new techniques.

**Endoscopic thyroid surgery:** Improves cosmetic outcomes and Ensures safe thyroid surgery as well

**Aims and Objectives:** To assess the feasibility and safety of Endoscopic Thyroid Surgery in our patients using the Axillo Breast approach and Transoral approach

**Material and Methods:** All cases of thyroidectomy done by a single surgeon from January 2013- June 2022 were included.

**Result:** A total of 321 patients were operated on endoscopically by three techniques including Axillo Breast approach 47, Bilateral axillary and breast approach 184, and Transoral via vestibular approach 90. The majority were Hemithyroidectomy 217 and Total thyroidectomy 84. The Mean age was 32.46yrs (12 to 70); Male to Female ratio was 1 to 5.4 Majority were benign Solitary thyroid nodules and multinodular goiter, however, thyroid cancer was also operated including Papillary thyroid cancer, Hurthle cell cancer, and follicular thyroid cancer. Most surgeries were Hemithyroidectomy however we had performed total thyroidectomy, and central and lateral neck dissection too. The surgical outcome was excellent including the mean tumor size was 5.23cm (1.5 to 11cm) weight was 34.00 grams (10 to 223), 10.87% of patients developed temporary biochemical hypocalcemia, and 37.14% of patients requires IV calcium infusion. 1.5% of patients develop temporary RLN palsy. Mean operative time was 157 min (2hrs 37min), Mean Hospital stay was 3.76days in BABA and 3.75days In Transoral approach. Final histopathology has 186 patients with Colloid goiter rests were Follicular adenoma and thyroid cancer (PTC 25, FTC 07).

**Conclusion:** Endoscopic Thyroid Surgery in thyroid tumors is safe and effective and is applicable both in benign and select malignant tumors. Transoral thyroidectomy is safe and complete with excellent cosmetic outcomes in a selected group of patients.

**FP-2-4**

**Transoral endoscopic thyroidectomy via vestibular approach: experience of initial 90 cases in India**

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**Introduction:** Transoral Endoscopic Thyroid Surgery via vestibular approach (TOETVA) has been popularized in developing countries however it is still in the infancy stage. TOETVA is the minimally invasive central approach to managing tumors in both lobes of the thyroid simultaneously with excellent surgical outcomes and esthetic satisfaction.

**Aims & Objective:** Here we are presenting an experience of 90 cases of TOETVA by a single surgeon from low resource country.

**Method:** This is a prospective observational study of consecutive selected 90 patients who underwent TOETVA from July 2019 to June 2022 and short-term follow-up in a tertiary care center in India.

**Result:** Mean Age 32.39 years, M:F ratio was 1:8. the Main indication of surgery was solitary thyroid nodule accounting for 88.44% of cases. The mean Tumour size was 5.34cm and the mean tumor weight was 37 grams, overall 81 were benign and 09 have malignancy. We have performed 79 Hemi thyroidectomies and 11 total thyroidectomies; 5 Central Compartment Neck Dissections (CCLND) were also associated. The median surgical time was 160 min (for hemithyroidectomy-160min, total thyroidectomy=180 min & total thyroidectomy with CCLND=208.75 min). The median hospital stay was 4 days. The swelling over the neck was present in 6 patients and only two patients develop postoperative hoarseness in voice. In 6 out of 9 patients those patients that underwent total thyroidectomy, the rate of transient hypoparathyroidism was 66.67%. Transient chin numbness was noticed in 50% of patients with a variable degree of intensity. On final histology majority were benign colloid goiter 56.67%, thyroiditis in 6.67%, Follicular adenoma in 26.67%, papillary thyroid cancer in 6.67% patients, and follicular thyroid cancer in 3.33% patients. All patients were satisfied with the aesthetic outcome.

**Conclusions:** Endoscopic Transoral thyroid Surgery is a recent addition to our department. Our results, based on the first 90 patients, show that it is a safe and effective approach when performed in optimally selected patients offering the best cosmetic result. Besides the new complications associated with this approach have been resolved during a short follow-up.



### FP-2-5

#### Transoral Endoscopic Thyroidectomy Vestibular Approach - Describing the first Australian Series

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##### Introduction:

Thyroidectomy is traditionally an open procedure. The potential for and unpredictability of patients developing an unsightly anterior neck scar has led many investigators to develop various 'scarless' thyroidectomy techniques. Here we report on our initial experience, and to our knowledge, the first and largest series of this technique in Australia and New Zealand.

##### Methods:

Across two centres in Western Australia, three Endocrine surgeons utilised the Transoral Endoscopic Thyroidectomy vestibular approach (TOETVA). Key endpoints such as operating time, blood loss, pain scores, recurrent nerve injury and hypoparathyroidism was collected.

##### Results:

125 TOETVAs were performed between March 2018 and November 2022. There were 82 hemithyroidectomies, 40 total thyroidectomies (5 converted to open), and 3 isthmusectomies. We noted a trend in median operating time decreasing over the study period. There were no cases of permanent recurrent laryngeal palsy, wound infection, seroma or haematoma. We had five instances of open conversion; two temporary RLN palsy, and 13 cases of temporary hypoparathyroidism.

##### Conclusion:

This is the first series of TOETVA reported in Australia and New Zealand. Our results demonstrate that with appropriate surgeon experience, training, collaboration, and in well-selected patients, this is a feasible and safe thyroidectomy technique.

### FP-3-1

#### Risk factors of lymph node macrometastasis in patients who underwent prophylactic central dissection

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##### Background

Central lymph node macrometastasis has a significant impact on disease recurrence in patients with papillary thyroid carcinoma (PTC). The aim of this study is to evaluate the risk factors for central lymph node macrometastasis (larger than 2mm in diameter) in patients with unilateral PTC who underwent thyroid lobectomy with prophylactic central neck dissection (CND).

##### Methods

This study is a part of multicenter prospective cohort study (MASTER), and a total of 1,038 patients were enrolled from 14 referral hospitals in Korea. Patients with tumor size less than 4cm, no or minimal extrathyroidal extension, and clinical stage N0 or N1a PTC were included, and all participants underwent a lobectomy as part of their treatment for PTC. Of these, 112 patients (10.8) who were lost to follow-up, 99 patients (9.5) who did not undergo CND, 18 patients (2.2) who underwent therapeutic CND, and 8 patients (0.8) with no pathological data on the size of metastatic lymph nodes were excluded. Finally, 801 patients were analyzed in this study.

##### Results

Of all the patients, central lymph node metastases were detected in 261 patients (32.6) and 108 patients (13.5) had macrometastasis. The results of univariate analysis revealed that sex, age, higher body mass index, extrathyroidal extension, lymphatic invasion and larger tumor size were significantly correlated with central lymph node macrometastasis ( $P < 0.05$ ). Multivariate logistic regression analysis demonstrated that male sex [odds ratio (OR) = 1.841,  $P = 0.014$ ], extrathyroidal extension (OR = 2.500,  $P < 0.001$ ), lymphatic invasion (OR = 2.379,  $P < 0.001$ ), and larger tumor size (OR = 1.687,  $P = 0.025$ ) were independent risk factors for central lymph node macrometastasis; age < 40 years old [(reference), 40-59 years old (OR = 0.528,  $P = 0.012$ ), more than 60 years old (OR = 0.405,  $P = 0.022$ )] were independent protective factors for central lymph node macrometastasis.

##### Conclusions

The present study revealed that male sex, extrathyroidal extension, lymphatic invasion, and larger tumor size were independent risk factors, whereas more than 40 years old was an independent protective factor for central lymph node macrometastasis. These results provide useful information considering prophylactic central neck dissection in patients with unilateral PTC.

### FP-3-2

#### Radioactive Iodine use in patients with low-risk thyroid cancer in Sri Lanka

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#### Introduction

Thyroid cancer is primarily treated with surgery and adjuvant radiotherapy. Radioactive iodine (RAI) is commonly utilized to ablate remaining thyroid tissue following total thyroidectomy. Evidence suggests a postoperative follow-up not involving RAI treatment is non-inferior to adjuvant RAI treatment in low-risk thyroid cancer patients.

#### Methods

We retrospectively analyzed prospectively collected data from a sample of 268 patients with thyroid cancer who underwent surgery in 2019 and 2020 at a dedicated tertiary cancer treatment center in Sri Lanka.

#### Results

The majority were females (224, 83.6%) with a mean age of 41.6 years (SD=13.5) at diagnosis. The commonest pathological types were papillary (202, 75.4%) and follicular carcinoma (47, 17.5%). A total of 137 (51.1%) patients had T1 tumors. T2, T3 and T4 were seen in 87 (32.5%), 40 (14.9%) and 4 (1.5%) patients, respectively. The nodal stage was N0, N1a, and N1b in 215, 32, and 20 patients respectively. Total thyroidectomy was done in 231 (86.2%) patients whereas 32 (11.9%) underwent lobectomy followed by completion thyroidectomy and 5 (1.9%) underwent hemithyroidectomy only.

Patients who were in T1, N0, and M0 staging without aggressive histology were categorized as low risk for analysis as per ATA risk stratification which included 111 patients. In the low-risk population, 76 (68.4%) underwent RAI treatment after a mean postoperative duration of 8.6±5.2 months. The commonest dosage used was 30 millicuries which were given to 52 patients. Four recurrences (3.6%) in the neck were detected after a median follow-up duration of 12.5 months.

#### Conclusions

A significant number of patients with low-risk thyroid cancers appear to have been treated with RAI in the study population. Excessive use of RAI in this population is a likely reason for the long delays in RAI observed. Reconsideration of RAI in low-risk thyroid cancer patients is advocated which would help reduce delays as well as the cost of treatment and treatment-related side effects.

### FP-3-3

#### Early Discharge After Total Thyroidectomy in Asian Patients Using Ionized Calcium Trend

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**Background:** In Asia, demand for acute hospital beds is increasing. Total thyroidectomy patients are often monitored for 48-72 hours in many hospitals. We prospectively evaluated the safety and predictive value of a cheap and easily available marker tested twice after surgery to facilitate next morning discharge.

**Methodology:** All patients undergoing Total thyroidectomy for benign or malignant pathology underwent pre-operative optimisation of Vitamin D. Trend of ionised calcium (iCa) levels immediate post-surgery and post-operative day 1 (POD1) morning were evaluated along with symptoms of hypocalcemia. Asymptomatic cases with iCa levels  $\geq 0.9$  mmol/L (normal 1.13-1.32 mmol/l) on POD1 were discharged.

**Results:** Among the 95 consecutive patients (mean age 41.7 +/- 11.6 years, F:M ratio = 77:18) undergoing total thyroidectomy, the indications were multinodular goiter (63.3%), malignancy (13.3%), Graves (16.7%) and Hashimoto's (6.7%). Mean Vitamin D levels before and after optimisation were 19.1 ( IQR 16.2-29.3) and 27.4 ( IQR 25.02 -34.6) ng/L respectively. Mean immediate post-operative and POD1 iCa levels were 1.10 [IQR 0.7 - 1.12] and 1.01 [IQR 0.76 – 1.18] mmol/L respectively showing a significant downward trend (beta = -0.76, p value <0.001). Symptomatic hypocalcemia was absent at iCa level  $\geq 0.9$  mmol/L. 91% patients were successfully discharged with an average hospitalisation of 1.3 days and no unscheduled readmissions. All patients were weaned off post-operative calcium and Vitamin D supplements within 2 weeks.

**Conclusion:** After optimisation of vitamin D deficiency, iCa trend after total thyroidectomy is a simple and accurate marker allowing safe and early discharge.

**FP-3-4****Prognostic factors of follicular thyroid carcinoma; is the present WHO classification appropriate?**

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**Backgrounds;** The present version of World Health Organization (WHO) classification divides follicular thyroid carcinoma (FTC) into three categories: minimally invasive (mFTC), encapsulated angioinvasive (eaFTC), and widely invasive (wFTC) FTCs. We investigated whether this classification appropriately reflects patients' prognoses. **Methods;** We enrolled 523 patients who underwent initial surgery and pathologically diagnosed as FTC at Kuma Hospital between 1998 and 2015. Capsular invasion (CI) was classified as none, minimal (microscopic), or wide (macroscopic) invasion; vascular invasion (VI) was divided into three degrees: VI(-), VI(1+), and VI(2+), according to the number of invasive foci. **Results;** For 507 M0 patients, age 55 years or older ( $p = 0.004$ ), non-oxophilic ( $p = 0.043$ ), and male sex ( $p < 0.001$ ) predicted poor distant recurrence-free survival (DR-FS) in univariate analysis, but tumor size  $>4$  cm, and wide CI did not. The DR-FS rates decreased significantly from VI(-) to VI(2+) in a step-by-step fashion, from VI(-) vs. VI(1+) ( $p = 0.011$ ) to VI(1+) vs. VI(2+) ( $p = 0.014$ ). On multivariate analysis, age 55 years or older ( $p = 0.0004$ ), non-oxophilic histology ( $p = 0.041$ ), male sex ( $p = 0.0052$ ), VI(1+) ( $p = 0.017$ ), and VI(2+) ( $p < 0.001$ ) independently predicted distant recurrence. The DR-FS rates did not significantly differ among mFTC, wFTC/VI(-), and eaFTC/VI(1+). The DR-FS rate of eaFTC/VI(2+) was worse than that of eaFTC/VI(1+) ( $p = 0.042$ ) but did not differ from that of wFTC/VI(1+/2+). **Conclusions;** In our series, wFTC/VI(-) showed an excellent prognosis and its DR-FS did not significantly differ from that of mFTC. Further, the prognosis of eaFTC patients differed according to the degree of VI. Thus, subclassification of eaFTC and reclassification of wFTC/VI(-) could be recommended.

**FP-3-5****ThyroSeq v3 for Bethesda III & IV nodules: a single institution case series**

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**Purpose:**

To report single institution outcomes of ThyroSeq v3 molecular testing selectively done on Bethesda III & IV nodules.

**Methods:**

Twenty-eight thyroid nodules diagnosed as category III or IV by The Bethesda System for Reporting were tested using ThyroSeq v3 from September 2020 to September 2022 at Seoul National University Bundang Hospital. Patients underwent either surgery or active surveillance after being informed of their ThyroSeq results, depending on their preferences. The histopathologic diagnosis obtained from patients who underwent surgery were then correlated.

**Results:**

Pre-operative biopsy showed 16 nodules (57.1%) as Bethesda category III, and 12 nodules (46.2%) as Bethesda category IV. The average size of these nodules were 1.83cm and 1.81cm respectively. ThyroSeq testing showed 12 nodules (42.8%) that tested negative and 16 nodules (57.2%) that tested positive. Mutations and gene fusion seen in positive nodules were as follows: NRAS, HRAS, BRAF, TERT, EZH1, THADA/IGF2BP3, RNF213/SLC26A11. All patients who showed positive results on ThyroSeq results were recommended for surgery, whereas patients with negative results were given the option of both active surveillance and immediate surgery. In total, 16 nodules were excised, where final pathology revealed malignancy in all nodules that tested positive.

**Discussion:**

Intermediate nodules may become burdensome when only around 20% of them turn out to be malignant. Therefore, more institutions were adopting molecular testing to reduce unnecessary surgery. These testing have mainly been conducted in Western countries and only few articles have investigated its efficacy in the Asian population. Thus, it was our interest to implement ThyroSeq testing in the Korean population. Although our cohort is limited to a relatively small population compared to previous studies, our current result shows that ThyroSeq v3 has a high accuracy in predicting malignant thyroid nodules. Moreover, we have found various mutations and gene fusions in our study including THADA/IGF2BP3, RNF213/SLC26A11. However, longer follow-up duration of active surveillance patients may be required to make conclusions about the specificity of ThyroSeq v3 testing.

**Conclusion:**

The initial outcomes ThyroSeq v3 molecular testing in Korean population prove to be highly effective in diagnosis of malignant thyroid nodules. However, longer follow-up duration is required to truly evaluate its false negative rates.



**FP-3-6****Prognosis of anaplastic thyroid cancer with distant metastasis**

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**Background:** Anaplastic thyroid cancer (ATC) is derived from follicular thyroid cells and is associated with the highest mortality risk of all thyroid malignancies. Because anaplastic thyroid cancer with distant metastasis is extremely rare, it is difficult to obtain information to characterize ATC. This study aimed to determine the clinical characteristics of ATC with distant metastasis and offer a method for the initial evaluation of patients diagnosed with ATC.

**Methods:** The medical records of 152 patients with ATC at Gangnam Severance Hospital were reviewed between January 2004 and March 2022. The medical records included demographics, tumor size, T, N, M stage, type of operation, other therapies except for surgery, overall survival, and median survival. The primary endpoint of the study was overall survival of the total patient sample, patients with ATC and distant metastasis, and those with ATC and brain metastasis.

**Results:** Of the 152 patients with ATC, 88 patients with distant metastasis at the time of diagnosis were identified. The survival rates were 24% for total ATC and 10% for ATC with distant metastasis. Survival for >1 year was 32% for total ATC and 15% for ATC with distant metastasis. The median survival differed significantly between the total ATC and ATC with distant metastasis groups (228.5 vs. 171 days). Among the ATC cases with distant metastasis, 17 (17%) had ATC with brain metastasis. There were no statistically significant differences in tumor size, T and N stage, and survival rates between patients with ATC with and without brain metastasis. The number of patients with ATC with single-site metastasis was 60, while 42 patients had multiple-site metastasis. There were no statistically significant differences between these two groups in T, N stage, and survival rates, except for tumor size (5.56 ± 2.25 in single-site metastasis, 4.6 ± 1.80 in multiple-site metastasis; 95% CI, 0.19–0.1.89; P = 0.02).

**Conclusion:** ATC with distant metastasis accounted for 58% at the time of diagnosis. Among the ATC cases, 11% had ATC with brain metastasis. ATC with distant metastasis exhibited a poor prognosis in terms of overall survival.

**FP-4-1****Balancing treatment of sporadic Medullary Thyroid Microcarcinoma**

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**Background:** Management of sporadic medullary thyroid microcarcinoma smaller than 1cm (micro-MTC) is controversial due to conflicting reports of prognosis and due to many series including both hereditary and sporadic patients. As these cancers are often diagnosed incidentally, they pose a significant management challenge.

**Methods:** Micro-MTCs were identified from a prospectively maintained surgery database and were reviewed to determine the international medullary thyroid carcinoma grading system (IMTCGS) grade. The primary endpoints were time to recurrence and disease specific survival (DSS). Prognostic factors assessed included size, grade, lymph node metastasis (LNM) and post-operative calcitonin.

**Results:** From 1995-2022, 64 patients were diagnosed with micro-MTC with 22 excluded due to hereditary disease, 67% were female with a median age of 60 and a median tumour size of 4mm. The diagnosis was incidental in 86% with 10% being high grade, 12% having LNM and 21% had elevated post-operative calcitonin. Over a 6.6-year median follow up, 12% developed recurrence and 7% died from MTC. High grade and LNM was associated with 10-year survival estimates of 75% versus 100% for low grade and no LNM (HR=831, P<0.01). High grade, lymph node involvement and raised calcitonin were associated with recurrence (P<0.01). Tumour size and surgical approach did not have any significant association with recurrence or survival. No patients with low grade micro-MTC and normal post-operative calcitonin developed recurrence.

**Conclusions:** Most sporadic micro-MTC are detected incidentally and are associated with good outcomes, but a small number develop recurrence. Size is not significantly associated with outcomes. Utilising grade and post-operative calcitonin allows for identification of patients at risk of recurrence to personalise management.

### FP-4-2

#### Thyroid-stimulating hormone suppression may prevent papillary thyroid microcarcinoma progression

Yasuhiro Ito, Akira Miyauchi, Makoto Fujishima, Takahiro Sasaki

*Kuma Hospital*

**Background:** Active surveillance (AS) for low-risk papillary thyroid microcarcinoma (PTMC) was initiated at Kuma Hospital in 1993 and has been gradually spreaded worldwide. We investigated the factors on and against PTMC enlargement in patients on AS.

**Methods:** We enrolled 2,705 patients with cytologically diagnosed PTMC who had undergone AS between January 2005 and July 2019. Patients with Graves disease were excluded. The median AS period was 5.5 years (range, 1.0-15.7 years). We defined tumor as enlarged when its maximal diameter increase by 3mm or larger. Chi-square test, Kaplan-Meier method, log-rank test, Cox proportional hazard, and logistic regression were used to compare variables.

**Results:** To date, 92 patients (3.4%) showed tumor enlargement and the 5-, 10-, and 15-year enlargement rates were 3.0%, 5.5%, and 6.2%, respectively. Young age (<40 years,  $p<0.001$ ), large tumor size (9 mm or larger,  $p=0.017$ ), and high detailed TSH score (3 or greater, higher than the lower normal limit,  $p=0.011$ ) were factors significantly predicting tumor enlargement in the multivariate analysis. In a subset of patients aged younger than 40 years, a low detailed TSH score (<3) was an independent factor against tumor enlargement ( $p=0.039$ ). Only 22 patients (0.8%) experienced novel lymph node metastasis, and the 5-, 10-, 15-year node metastasis rates were very low, at 0.9%, 1.1%, and 1.1%, respectively.

**Conclusions:** PTMC in young patients more likely to enlarge during AS. Mild TSH suppression to achieve a low normal range may prevent carcinoma enlargement, although prospective studies are needed to draw more reliable conclusions.

### FP-4-3

#### Suppressive effect of levothyroxine on disease progression of low-risk PTMC on active surveillance

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*Kuma Hospital*

**Background:** It has been reported that TSH levels affect disease progression in patients with low-risk papillary thyroid microcarcinoma (PTMC) during active surveillance (AS). In this study, we investigated whether TSH suppression with levothyroxine affected disease progression. **Patients and Methods:** From 2005 to 2019, 2896 patients diagnosed with low-risk PTMC at Kuma Hospital opted AS. Of these, 2497 patients who have undergone 4 or more ultrasound examinations were enrolled. Patients with Graves disease or other thyroid cancers were excluded. Of them, 2175 patients (GroupI) did not receive levothyroxine (LT4) at the diagnosis: while 1951 patients (GroupIA) did not receive LT4 during the entire course of AS, 224 patients (GroupIB) began receiving it during the course. The remaining 322 patients (GroupII) received LT4 before or from the time of the diagnosis. With the tumor sizes on ultrasound examinations, Tumor Volume-Doubling Rates (TV-DRs) were calculated for each patient. Disease progression was defined as tumor enlargement by 3 mm or more and/or appearance of novel lymph node metastasis. **Results:** Disease progression rate at 10 years in GroupI and GroupII were 4.2% and 2.5%, respectively ( $p=0.169$ ). TV-DR in GroupII was significantly lower than that in GroupI (-0.056/year vs. -0.004/year, respectively,  $p<0.01$ ). Disease progression rate in GroupIB was significantly higher than that in GroupIA (3.5% and 11.6%, respectively,  $p<0.01$ ), clearly indicating patients with signs of progression were selectively prescribe LT4. TV-DR in GroupIA was significantly higher than that in GroupII (-0.007/year vs. -0.056/year, respectively,  $p<0.01$ ), and TV-DR in GroupIB was also significantly higher than that in GroupII (0.024/year vs. -0.056/year, respectively,  $p<0.05$ ). **Discussion:** The difference in disease progression rates in GroupI and GroupII did not reach significance. However, TV-DR in GroupII was significantly smaller than that in GroupI, and than that in GroupIA and IB. These might suggest that TV-DR is more sensitive in evaluating disease progression than the traditional disease progression definition, and that LT4 administration suppressed disease progression of PTMC during AS. GroupIB clearly incorporated selection bias, and GroupIA did also by deleting patients with progressive signs. **Conclusion:** Prescribing LT4 to low-risk PTMC patients on AS may suppress disease progression. Further studies are needed to confirm this promising result.

### FP-4-4

#### Colloid leak effects during surgery

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SGPGIMS

##### Background:

Thyroidectomy is the common most common endocrine surgical procedure varies from Scalpel to Robotic transoral thyroidectomy. Colloid nodules are common and easily operable without any difficulty. We report a phenomenon where in the surgery becomes difficult and lead to complications if not thought with this phenomenon colloid leak.

##### Material and Method:

The endocrine surgeon has been involved in training of over 25 superspeciality endocrine trainers over a period of nine years in a tertiary referral high volume center. He has participated in 700 Thyroidectomies of which 250 thyroidectomies for colloid goiter. We have observed this phenomenon in 5 patients over 5 years in a tertiary referral centre in north India.

##### Result:

5 male patients had this colloid leak. Mean BMI was 22. FNAC was colloid in all patients. 3 had colloid leak in all planes. 2 had only per thyroidal leak. All patients had Recurrent Laryngeal nerve identified. In 1 patient only 1 parathyroid gland could be identified. All patients operated within 2 weeks of FNAC. All HPT was colloid. Immunohistochemistry revealed IgG4 stained plasma cell aggregates in the line of colloid leak.

##### Discussion:

This phenomenon was observed in muscular males in the colloid goiters where in there is leak of colloid after FNAC and this colloid elicited an inflammatory response in the surrounding tissues as evidenced by IgG4 positive immunohistochemistry staining for plasma cells. This phenomenon was more pronounced 5 to 7 days after FNAC. The planes were stuck and mobilization of gland was difficult in one patient a small cuff of muscle had to be removed. This fact of colloid leak causing chronic inflammation may be a harbinger of chronic changes and may a role in tumorogenesis.

##### Conclusion:

Astute Endocrine Surgeon should be aware of this colloid leak phenomenon and when found the dissection should be very careful to prevent complications during thyroidectomy.

### FP-4-5

#### Should we operate all Bethesda IV nodules without molecular testing?

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##### Background

Follicular neoplasia of thyroid gland (Bethesda IV) is the most often indication for thyroid surgery. As the histological examination is the only 100% correct method to confirm malignancy, surgery is a gold standard for FN treatment. Genetical testing is quite expensive, and unavailable in many countries and its accuracy is still under question, due to the limitations of validation and post validation cohorts.

According to various studies risk of malignancy is 25-40%. The majority of malignancies are forms of papillary thyroid cancer, expected to demand active surveillance in nodules less than 2 cm.

##### Materials

Continuous cohort of 4399 cases operated in SPbU Hospital 2020-2021 with Bethesda IV cytology after FNAB with MG staining. Females in 3654 cases (83,1%), age 49,40±15,11, males were 49,10±14,62 y.o.

##### Results

Out of them 1296 (29,5%) got malignant thyroid lesion by final histological exam. But 406 of them (31,3%) were found in non-punctured minor nodule.

Of 980 cases of FN found to be malignant nearly half (46%, N=446) were NIFTP or minimally invasive follicular thyroid cancer. And only in 185 (8,8%) had reported invasion at list of own capsule. 39 had invasion of gland capsule (4%). 29 (3,6%) had vascular invasion or were suspicious.

3066 patients had nodule ≤2 cm. 578 had cancer in it (18,9%). With the same proportion (262; 45,3%) of them got NIFTP of minimally invasive follicular thyroid cancer. But risk to find cancer with aggressive features was only 0,9% (comparing to 6,4% in cancers found in nodules larger then 2 cm. OR=7,4 risk of aggressive cancer in any node ≤2 cm was 0,16%, in larger 1,5%. Most of all cancers were found to be cancers which meet criteria of active surveillance.

We performed ROC analysis (AUC=0.84)

Cut off of 3 cm diameter for risk of aggressive showed sensitivity of 0.8 (0.64 - 0.92), and specificity - 0.79 (0.78 - 0.81). For 2 cm sensitivity was 0.84 (0.68 - 0.96), specificity 0.6 (0.59 - 0.62). NPV for 3 cm was 0.9984 (0.9971 - 0.9994), for 2 cm 0.9983 (0.9966 - 0.9996).

##### Conclusion

It seems that parents with nodules ≤2 cm can safely avoid surgery until the nodules grow up even if no genetic test is performed. Or even ≤3 cm if surveillance criteria for papillary thyroid cancer will expand.

### FP-4-6

#### Aggressive subtypes of papillary thyroid carcinoma smaller than 1 cm

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**Background:** Tumor size is important in determining the range of surgery in papillary thyroid carcinomas (PTCs), especially those smaller than 1 cm. We aimed to analyze the features of small PTCs with aggressive subtypes based on histological characteristics.

**Methods:** In this retrospective study, we reviewed the medical records of 11,570 patients with PTCs  $\leq$  1 cm who underwent thyroidectomy between January 2009 and December 2016. Aggressive subtypes included diffuse sclerosing, solid, tall cell, columnar cell, and hobnail subtypes.

**Results:** Among the 11,570 patients with PTCs  $\leq$  1 cm, 177 aggressive PTC subtypes were identified. Propensity score matching revealed 110 tumors (62.1%) with extrathyroidal extension of aggressive PTC subtypes and 451 (51.1%) non-aggressive PTC subtypes (95% confidence interval [CI], 0.41–0.80,  $P < 0.001$ ). Metastatic central and lateral neck lymph nodes constituted  $3.06 \pm 3.67$  and  $3.81 \pm 5.39$  of aggressive PTC subtypes and  $1.22 \pm 2.14$  and  $2.85 \pm 3.79$  of non-aggressive PTC subtypes, respectively (central neck nodes: 95% CI, 1.42–2.26,  $P < 0.001$ ; lateral neck nodes: 95% CI, 2.9–5.90,  $P < 0.001$ ). Seven patients with aggressive PTC subtypes (3.95%) and 12 with non-aggressive PTC subtypes (1.7%) exhibited recurrence.

**Conclusion:** Aggressive subtypes of small PTC tumors  $\leq$  1 cm exhibited more extrathyroidal extension and neck node metastasis. This study suggests that surgeons should consider the aggressive subtypes as important factors when deciding the range of surgery in PTCs smaller than 1 cm.

### FP-5-1

#### Can be phenotype be sufficient for choosing correct initial volume of operation for MTC?

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Availability of preoperative assessment of germline RET status is very low in majority of populations. We investigated whether performing a hemithyroidectomy with central neck dissection to patients considered phenotypically and clinically to be sporadic affects the risk of biochemical remission.

#### Materials

A continuous retrospective study included 544 patients with histologically confirmed MC, initially operated on in 2010–2021 at the St Petersburg University Hospital.

In 64,0% of cases patients tested germline RET mutations. In 25,3% of them, the RET mutation was detected. In 95,0% it was performed postoperatively. In our national guidelines initial treatment of medullary thyroid cancer require thyroidectomy with central neck dissection. But to reduce possible complications patients with phenotypically sporadic medullary thyroid cancer were proposed to undergo hemithyroidectomy with bilateral central neck dissection. Phenotypically sporadic were considered in all cases with solitary thyroid node, or with other nodes proven to be benign or ptc. Patients with bilateral lesions, coexistence of pheochromocytoma, family history of MTC were considered to be markers of hereditary form. Primary hyperparathyroidism with no signs of multiglandular disease was ignored due to relatively high rate in general population.

Lateral neck dissection was performed if metastasis were proven by FNAB and/or high calcitonin in flush. In some cases when during initial surgery we had loss of signal or it' great decrease on intraoperative neuromonitoring and chose staged thyroidectomy and got normalization of serum calcitonin and canceled reoperation.

Totally in 80 cases (14,7%) final volume of thyroid resection was hemithyroidectomy.

#### Results

From all patients available for follow up biochemical remission was attained in 72,4%, of them only 2,5% were pN1a and 0,6% - pN1b. (OR - 13,5 [95% CI: 5,5 - 32,9]). After hemithyroidectomy with neck dissection rate of biochemical remission was 72,86% [95% CI: 61,39, 81,95], after thyroidectomy with neck dissection 72,35% [95% CI: 67,79, 76,48]. Also, we did not find any differences within progression free survival.

#### Conclusion

The decision on the volume of the operation can be made in consensus of the surgeon and the patient before the results of the genetic study are obtained based of initial presentation.



FP-5-2

**Clinicopathologic Outcomes of Poorly Differentiated Thyroid Cancer: single institutional experience**

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**Clinicopathologic Outcomes of Poorly Differentiated Thyroid Carcinoma : a single-center experience**

Backgrounds

Poorly differentiated thyroid carcinoma represents the main cause of morbidity and mortality from non-anaplastic follicular cell derived thyroid cancer and is therefore clinically highly significant. Due to the relative rarity of the poorly differentiated thyroid carcinoma, its characteristics and conclusive treatment modality have not been fully established. The purpose of this retrospective study was to investigate its clinicopathologic characteristics, management and outcomes of patients with poorly differentiated thyroid carcinoma.

Methods

We conducted a retrospective review of 26 patients diagnosed poorly differentiated thyroid carcinoma after surgery from Jan. 2007 to April. 2020 in Thyroendocrine Department of Severance Hospital. Histological diagnosis was based on Turin Criteria. The medical data of patients was analyzed retrospectively. Files were reviewed for background data, clinicopathological characteristics, treatment and outcome.

Results

Patient and tumor characteristics

Of the 26 patients, 73.1% were female. Median age was 59.0 years (range, 8 to 87). Eight patients (30.7percent) had a primary tumor greater than 4 cm. Fifteen patients (57.7percent) had pathological N stage pN0, 4 (15.4percent) pN1a, and 4 (15.4percent) pN1b, and 3 patients had no recorded location (N1x). Five patients (19.2percent) presented with distant disease. 57.7 percent of patients had total thyroidectomy, 15.4 percent had lobectomy, and 26.9 percent had completion thyroidectomy.

Outcomes

With a median follow-up of 37.9 months (range, 1 to 131 months), the 5-year overall survival and disease free survival were 85 percent and 90 percent, respectively. Five patients (19.2 percent) had distant disease, and an additional 2 developed locoregional recurrences. Two patients (7.7 percent) died of poorly differentiated thyroid carcinoma: 1 of distant, 1 of locoregional disease.

Conclusion

Poorly differentiated thyroid carcinoma is an aggressive thyroid cancer histotype. A close monitoring is required to improve its outcome. Our data suggest that with appropriate surgery and adjuvant therapy, excellent locoregional control can be achieved in poorly differentiated thyroid carcinoma.

FP-5-3

**Analysis of risk factors to predict occurrence and prognosis of postsurgical hypertrophic thyroidectomy scar development: A review of 4,238 cases**

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Postsurgical wound is important to both patients and physicians. If hypertrophic scarring rather than just linear scarring develops, it can cause physical symptoms as well as the cosmetic disfigurement. Patients with hypertrophic scars experience itching, pain, and tightness. In our clinical experience, it is important to identify the patients who will need close follow-up for development of a hypertrophic scar, because early intervention can prevent prolonged and severe hypertrophic scars. However, predicting which case will develop hypertrophic scarring is quite difficult even to the board-certified dermatologists. Therefore, this study aimed to investigate the occurrence and prognosis of hypertrophic scarring following thyroidectomy. A total of 4,238 patients were included in the study. The overall occurrence rate of hypertrophic scar development was 35.3%. The multivariable analysis found that hypertrophic scar development was associated with young age (odds ratio [OR] = 0.949,  $p < 0.0001$ ), male sex (OR = 0.562,  $p < 0.001$ ), high body mass index (BMI) (OR = 1.137,  $p < 0.0001$ ), prominent sternocleidomastoid muscles (OR = 2.522,  $p < 0.0001$ ), scarring located within 1 cm of the sternal notch (OR = 4.345,  $p < 0.0001$ ), and a history of keloid development (OR = 2.789,  $p = 0.0031$ ). The prognosis for hypertrophic scarring was associated with scar location within 1 cm of the sternal notch (beta = 4.326,  $p = 0.0429$ ) and a history of keloid development (beta = 23.082,  $p < 0.0001$ ). This study revealed that the occurrence of hypertrophic scar was associated with specific factors, such as age, sex, BMI, scar location relative to the sternal notch, presence of prominent sternocleidomastoid muscles, and a history of keloid development. Prognosis after treatment of hypertrophic scarring was associated with scar location relative to the sternal notch and a history of keloid development.



### FP-5-4

#### **Tension-free thyroidectomy (TFT, medial thyroidectomy) - experience of initial 259 cases**

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#### Materials

TFT is based on the medial approach to the recurrent laryngeal nerve (RLN) and full mobilization of the parathyroid glands after the division of isthmus and total dissection of Berry's ligament. During the procedure only lateral traction is applied to the thyroid lobes. The thyroid is extracted out of the neck after it is completely mobilized from the trachea, the RLN, the parathyroid glands. 259 consecutive patients (346 RLN and 692 parathyroid glands at risk) underwent TFT performed by one surgeon. Lobectomy was carried out in 172 (66, 4%) patients (in 54 cases - with central neck dissection, in 3 cases - with central and lateral neck dissection). Indications for surgery were papillary (N = 127), medullary cancer (N = 5), follicular neoplasia (N = 49), Graves disease (N = 22), nodular toxic goiter (N = 8), nodular euthyroid goiter (N = 3). Mean thyroid nodule size was 24 mm (ranged 4 - 200 mm). Mean thyroid volume was 85 ml (ranged 10 - 500 ml). Intraoperative transient neuromonitoring was used in all cases (5 mA), in 20 cases permanent neuromonitoring was also used. Laryngoscopy was routinely used prior and after surgery. Calcium and parathormone level were measured in patients after thyroidectomy on the first, 14th, 30th postoperative days.

#### Results

The mean operating time of lobectomy was 56 min. Unilateral RLN palsy was revealed in 6 cases (1,7% of nerves at risk, NAR). Among these patients 50% drop of signal amplitude during surgery was revealed in 3 cases. Intraoperative loss of signal (LOS) occurred in 3 cases. In 4 of these patients normal vocal fold function was confirmed on the 30th day after surgery. Nerve palsy still exists in 2 patients (0,6% of NAR, 1 case is only 1 month ago). 10 patients (out of 87 in the total thyroidectomy group - 11,5%) exhibited a decrease of PTH level on the postoperative day 1. In 2 (2,3%) patients PTH level is still low now (both cases 1 month ago).

#### Conclusion

TFT (tension-free thyroidectomy) can be considered a safe and feasible operation.

### FP-5-5

#### **Surgical indications for upper mediastinal dissection by sternotomy in patients with PTC**

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Introduction: Papillary thyroid carcinoma (PTC) is a relatively indolent disease, despite the high incidence of lymph node metastases. Although less frequent, some upper mediastinal metastases of PTC cannot be removed without sternal resection. In this study, we investigated the prognostic impact of upper mediastinal dissection (UMD) by sternotomy on patients with mediastinal metastases of PTC. Materials & methods: Charts of patients with PTC who underwent surgical treatment at our institution between 2006 and 2018 were retrospectively reviewed. Fifty-eight patients with upper mediastinal metastases were enrolled. Kaplan-Meier survival curves were compared for statistical significance. A Cox hazard regression model with the stepwise forward method was used for the multivariate analysis to determine their association with mediastinal recurrence. Results: Of the 58 patients with mediastinal metastasis, 12 (20.7%) underwent dissection of the prevascular nodes, 51 (87.9%) underwent dissection of the upper paratracheal nodes, and 14 (24.1%) underwent dissection of the lower paratracheal node. The preferred site of mediastinal metastasis was the upper paratracheal nodes. The five and 10-year disease-specific survival rates for patients after UMD were 74.6% and 58.7%, respectively. Among 25 patients (43.1%) with locoregional recurrence, 12 (20.7%) had a mediastinal recurrence, and seven were eligible for additional UMD. Although distant metastasis was the predominant poor prognostic factor, mediastinal recurrences were more frequently unresectable than cervical recurrences, suggesting that mediastinal recurrence is a poor prognostic factor. Complications associated with mediastinal dissection were observed in 12 patients (20.7%). Two patients had severe complications (mediastinitis: 1, brachiocephalic artery rupture: 1). Mediastinal metastases larger than 30 mm or metastases to the lower paratracheal nodes are considered risk factors for mediastinal recurrence. Conclusions: UMD by sternotomy for patients with upper mediastinal metastases, which are difficult to resect via transcervical approach, is an effective treatment option to improve patient prognosis.

### FP-6-1

#### Microwave Ablation for Solid Benign Thyroid Nodules: Initial Experience

Sanjay Kumar Yadav

*NSCB Medical College*

##### Background.

Percutaneous ultrasound-guided microwave ablation (MWA) for benign solid thyroid nodules is the newest modality for treatment. We are sharing our initial experience

##### Methods.

A retrospective study was conducted to assess the efficacy and complications of MWA. The volume changes of the nodules were evaluated before and after microwave ablation, and the cosmetic grading and clinical symptoms were assessed as well.

##### Results:

The volume of all benign thyroid nodules decreased after microwave ablation. All the patients are well tolerated to the procedure. Only 1 patient (1.3%) developed slight burn on cervical skin and no other complications occurred.

##### Conclusions:

Ultrasound-guided percutaneous microwave ablation is acceptable treatment modality.

### FP-6-2

#### Makeshift wound protector for small incision thyroidectomy- observations from a tertiary centre

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**Introduction:** One of the most important aspects of thyroidectomy, especially from patients' perspective, is the operative scar. Though many remote-access/endoscopic techniques are in vogue, open thyroidectomy (OT) remains the standard procedure. Skin damage due to retractor pressure/ cautery burns result in undesirable scars, particularly in small incisions. We aim to prevent such damage with wound protectors (WP) prepared using sterile surgical gloves.

**Methodology:** An observational study of 52 patients undergoing thyroid surgery at Max Superspecialty Hospitals (Shivamogga, India), from March 2021 to July 2022 (17 months). Patients with incisions 5 cm or less were included. Those with known latex allergy were excluded. First 31 patients underwent surgery in the conventional method and subsequent 21 patients with the WP in place. Distal end of sterile, powder free gloves were cut from the proximal (fingers) part. Two rectangular flaps are fashioned, which are sutured to the platysmal edges of upper & lower skin flaps. This covers the cut edge of the skin, on which retractors/instruments are placed. Standard principles are followed throughout the surgery. After the procedure, the glove flaps are detached from the platysma & wound closed. Scars were assessed using the Patient & Observer Scar Assessment Scale (POSAS 2.0) format, 2 weeks after the procedure.

**Results:** Fifty females & 2 males constituted the 52 patients. Mean age was 42.13 +/- 13.01. Thirty-seven patients had benign goitre while 15 were malignant. The parameters assessed are as shown in the table.

The mean incision length without WP was 4.05 (+/- 0.53) cm, while with WP was 3.84 (+/- 0.50) cm. The reduction in incision length was significant (p- 0.037). Patient Scar Assessment Score without WP was 11.19 (+/-2.80) & with WP was 8.71 (+/- 2.39). With a mean difference of 2.476 (+/- 4.11) and p- 0.012, the improvement was statistically significant. Observer Scar Assessment Scale without WP was 12.38 (+/-3.26) & with WP was 9.29 (+/- 2.84). the mean difference was 3.095 (+/-4.80) & p- 0.008, showing significant improvement. Scar pigmentation, thickness & pliability showed significant improvements, while vascularity & relief did not.

**Conclusion:** The sterile surgical glove derived WPs are useful & economical in thyroidectomy. Small incisions with significantly less skin damage are possible with their usage in appropriately selected cases.

### FP-6-3

#### Noise level and surgical team stress during thyroidectomy in an Endocrine Surgery operating room

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##### Introduction:

Noise in the operating room is an ongoing problem and impacts the outcome of surgery. Noise as stressor can produce a startle reaction and activate fight or flight response of the autonomic and endocrine system. The psychobiology of the stress as assessed by salivary cortisol level is a sensitive measure of allostatic load. In this study, we correlated salivary cortisol levels of the surgical team with noise measurement and also whether the noise in OR subjectively affected the operating team.

##### Materials & Methods:

Prospective observational study conducted in OR of a tertiary referral centre. We recorded the noise or from shifting in to shifting out using digital sound level meter. the operating team – Operating Surgeon (S), Anesthetist (A), Scrub Nurse (N) and Floor Nurse (F) all gave a salivary sample for measurement of cortisol at the end of the procedure. We had measured baseline salivary cortisol for Surgeons. Questionnaire for assessment of distraction was filled in by the S, A and N at the end of the procedure. Salivary cortisol levels were analysed using SLV-4635 (formerly SLV-2930) DRG Instruments GmbH German using ELISA. Statistical analysis was performed using SPSS 22.0.

##### Results:

Total of 37 procedures with 148 Salivary Cortisol samples and 111 responses from S, A and N were analysed. All Patients with benign FNAC were operated (64.9% - Colloid). Mean TSH levels were  $3.5 \pm 6.7$ . Majority had STN (25/37 67.6%). 18 patients (48.6%) underwent open Hemithyroidectomy 10 patients TT and 8 patients Endoscopic HT and 1 Pt had sistrunk's procedure. The Mean Cortisol levels of S, N, A and F and mean noise levels are provided in the table 1. There was significant Correlation between mean noise levels and S's levels. ( $P < 0.05$ ).

##### Conclusion:

Noise levels were high in the OR during initial phase and closure phase of thyroidectomy. 'S' was more affected by noise especially during critical phases of Surgery such as RLN dissection. Serum cortisol level were high for S when compared to N, A and F. No studies in Literature regarding noise correlation and Surgeons stress. Noise is a distractant and the effect of long term effect on the surgical team needs to be studied.

### FP-6-4

#### CALCIUM INFUSION COMPARED TO PLACEBO IN REDUCING HYPOCALCAEMIA AFTER TOTAL THYROIDECTOMY

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**INTRODUCTION:** Total thyroidectomy is a commonly performed procedure and is an accepted treatment modality for thyroid diseases. Hypocalcaemia is a common complication after total thyroidectomy. Administration of prophylactic intravenous calcium may reduce the rate of early symptomatic hypocalcaemia. We compared the hypocalcaemia rate in the early phase (first 48 hours) after total thyroidectomy between one arm with the administration of prophylactic calcium infusion versus a placebo arm. Patients in both arms received baseline oral calcium and vitamin D.

**METHODOLOGY:** Patients undergoing elective total thyroidectomy in the Endocrine Surgery Unit in University Malaya Medical Centre from June 2020 to May 2022, were recruited and randomized to either the prophylactic calcium gluconate infusion or placebo arm. Both groups received similar dosages of oral calcium and vitamin D post-operatively. The primary outcome measured was the early hypocalcaemia rate (within 48 hours) after total thyroidectomy. The secondary outcome was the length of hospital stay after total thyroidectomy. Continuous data is shown in median (IQR) unless otherwise stated. Mann-Whitney test was performed for comparison of continuous variables between the different groups while Chi-square test was performed for categorical data analysis. A p-value of  $< 0.05$  was considered as statistically significant. Data collected in the study was analysed using per-protocol analysis.

**RESULT:** Thirty-four patients were recruited and randomized into intervention and placebo arms, 17 patients in each arm respectively. There was no significant difference in the early symptomatic hypocalcaemia rate between the intervention and placebo arms (0% vs 5.88%,  $p = 1.00$ ). The median serum calcium levels were comparable between the intervention and placebo arms at 6 hours (2.33 mmol/L vs 2.37 mmol/L,  $p = 0.593$ ) and 48 hours (2.26 mmol/L vs 2.23 mmol/L,  $p = 0.190$ ) post total thyroidectomy. However, the median serum calcium level at 24 hours was significantly higher in the intervention arm than the placebo arm (2.31 mmol/L vs 2.22 mmol/L,  $p = 0.015$ ). The duration of hospital stay post total thyroidectomy was similar in both groups.

**CONCLUSION:** Routine prophylactic calcium infusion on top of oral calcium and vitamin D supplements does not reduce the rate of early symptomatic hypocalcaemia post total thyroidectomy in low-risk group. However, this finding needs to be further evaluated in a larger scale, multi-centre RCT study incorporating more subjects.

**FP-6-5****Estrogen promotes thyroid cancer progression by enhancing infiltration and M2 polarization of TAM**

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**Background:** The biological mechanisms underlying gender disparity in the presentation of thyroid cancer remain elusive. However, recently, the oncogenic effects of 17 $\beta$ -estradiol (E2) on tumor-infiltrating immune cells, including macrophages, have been demonstrated. Although the pro-tumorigenic actions of tumor-associated macrophages (TAMs) in advanced thyroid cancers have been established, the molecular mechanism underlying TAM recruitment and polarization is still unclear. Thus, this study aimed to identify the role of estrogen in TAM recruitment and thyroid cancer progression.

**Methods:** Two thyroid cancer cell lines (TPC-1 and BCPAP) and a human monocytic leukemia cell line (THP-1) was used to evaluate E2 responsiveness. Transwell migration assays were performed using those cells. THP-1-derived macrophages were treated with E2, and mRNA levels of M1 or M2 gene were analyzed by qRT-PCR. For the in vivo tumorigenicity assay, TPC-1 with or without THP-1 cells were implanted into the thyroid lobe of ovariectomized (OVX) or sham-operated (Sham) Balb/c-nude mice.

**Results:** The transwell assay showed that the migration of thyroid cancer cells increased with E2 treatment in a dose-dependent manner, which was further enhanced on co-culture with THP-1-derived macrophages. The migration ability of THP-1 cells was also stimulated by E2. qRT-PCR results revealed that the mRNA expression of pro-inflammatory cytokines were downregulated and M2 markers were upregulated when THP-1-derived macrophages were treated with E2. Inhibition of tumor growth and decreased infiltration of TAMs (CD45+CD11b+F4/80+) were observed in the OVX group, as compared to the Sham or OVX+E2 group. The tumorigenesis rate due to THP-1/TPC-1 co-injection was 1.75 times higher than that due to TPC-1 alone in the Sham group (40% vs. 70%), with no significant difference (32% vs. 36%) in the OVX group.

**Conclusions:** Thus, E2 enhanced the migratory and tumorigenic properties of thyroid cells as well as the migratory and M2 properties of monocytic cells. The findings also indicate that the progression of thyroid cancer may potentially be attributed to the pro-tumoral activities of TAMs in the presence of E2.

**FP-7-1****Impact of urinary calcium excretion on urinary stones in primary hyperparathyroidism**

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**Introduction**

Guideline for the management of asymptomatic primary hyperparathyroidism (PHPT) 2013 raises urinary calcium excretion (U-Ca) over 400 mg/day as a risk of urinary stone (US). The aim of this study is to verify the validity of U-Ca over 400 mg/day as a risk of US in PHPT and mild hypercalcemic PHPT (MHPHPT).

**Materials and Methods**

Data were retrieved from 756 patients who undergone operation for sporadic PHPT. US was confirmed preoperatively in 298 patients (39.4%). Serum calcium level was <11 mg/dl in 416 patients and 158 patients (37.9%) had US. Preoperative data was compared between patients with and without US to find out risk factors of US and optimal cut off value of U-Ca for US risk using ROC curve.

**Results**

Compared to those without US, patients with US were significantly male (38.9% vs 21.0%,  $p < 0.01$ ), younger (mean age [SD]: 54.8 [14.0] vs 59.9 [13.6],  $p < 0.01$ ) and had lower serum phosphate level (mean [SD] mg/dl: 2.4 [0.4] vs 2.5 [0.5],  $p = 0.02$ ), higher serum creatinine level (mean [SD] mg/dl: 0.78 [0.29] vs 0.73 [0.34],  $p = 0.04$ ), higher urinary phosphate level (mean [SD] g/day: 0.65 [0.19] vs 0.59 [0.19],  $p < 0.01$ ) and urinary creatinine level (mean [SD] g/day: 0.99 [0.33] vs 0.84 [0.31],  $p < 0.01$ ). There was no significant difference in U-Ca. Proportion of U-Ca over 400 mg/day was 13.8%. Sensitivity and specificity of U-Ca over 400 mg/day was 9.7% and 91.3% and of U-Ca over 210 mg/day was 64.8% and 41.0% for US.

MHPHPT patients with US were significantly male (39.2% vs 15.1%,  $p < 0.01$ ), younger (mean age [SD]: 54.9 [13.4] vs 59.6 [12.2],  $p < 0.01$ ) and had lower serum phosphate level (mean [SD] mg/dl: 2.5 [0.4] vs 2.6 [0.4],  $p = 0.04$ ), higher urinary phosphate level (mean [SD] g/day: 0.65 [0.19] vs 0.59 [0.18],  $p < 0.01$ ) and higher urinary creatinine level (mean [SD] g/day: 0.98 [0.32] vs 0.83 [0.29],  $p < 0.01$ ). There was no significant difference in U-Ca. Proportion of U-Ca over 400 mg/day was 5.3%. Sensitivity and specificity of U-Ca over 400 mg/day was 5.1% and 94.6%, and of U-Ca over 210 mg/day was 60.1% and 48.9% for US.

**Conclusion**

U-Ca was not higher in PHPT patients with US than in those without US. Proportion of U-Ca over 400 mg/day was low in PHPT patients especially in MHPHPT. U-Ca 400 mg/day as a cut off value is too high for US risk.



**FP-7-2****The effect of Parathyroidectomy on Cardiovascular Risk Factor in Primary Hyperparathyroidism**

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*PGIMER*

**Introduction:**

Primary hyperparathyroidism (PHPT) is the most common parathyroid disorder and has been associated with hypertension and structural or functional cardiovascular changes which is the major cause of morbidity and mortality. PHPT is also associated with metabolic disorders like impaired glucose metabolism, diabetes mellitus, dyslipidaemia, hypertension, obesity, which are the potential cardiovascular risk factors. Therefore, we aim to evaluate the cardiovascular risk factors at diagnosis and improvement in these risk factors after parathyroidectomy.

**Methodology**

Twenty-six patients who underwent parathyroidectomy for PHPT were included. Cardiometabolic risk factors were evaluated before and 6 months after curative parathyroidectomy. Insulin resistance was calculated using the homeostasis model assessment -insulin resistance (HOMA-IR) formula. Framingham General Cardiovascular Risk Score (CRS) was computed through the online interactive risk score calculator. Left ventricular ejection fraction (LVEF), left ventricle diastolic dysfunction, left ventricular hypertrophy (LVH), LV mass-index (LVMI), mitral and aortic valve morphology were recorded by 2D-ECHO. Bone mineral density (BMD) and fracture risk was also assessed by Dual energy x-ray absorptiometry (DEXA) scan.

**Results**

Metabolic syndrome included waist circumference, fasting blood glucose, blood pressure, serum triglycerides and serum HDL; 8 of 26 patients had MS and it improved in 6 patients after curative surgery (p 0.014). Mean Framingham CRS reduced from  $5.35 \pm 7.53$  to  $4.02 \pm 5.87$  after PTx. Overall, the 10 year risk of acquiring hard coronary artery disease decreased from 2% to 1% (p 0.001). On 2 D echo, significant improvement was observed in LVEF (p 0.022), LVH (p 0.317) and diastolic dysfunction (p 0.034) after parathyroidectomy. There was also improvement in LVMI and valvular dysfunction, however, it did not attain statistical significance. Serum insulin and HOMA-IR showed no change and the risk of an increased predisposition to type-2 diabetes mellitus remained the same.

BMD improved significantly in distal end of radius, neck of femur and L1-L4 vertebra with decrease in the overall fracture risk at 6 months after parathyroidectomy (p <0.001).

**CONCLUSION**

This study has clearly demonstrated improvement in cardiovascular risk factors and bone mineral density in PHPT patients after parathyroidectomy. Also, there was decrease in 10-year risk of coronary artery disease from 2% to 1% when assessed with Framingham CRS. Hence, we suggest that parathyroidectomy should be considered as a treatment option in patients of PHPT who have metabolic syndrome.

**FP-7-3****Assessment of left ventricular dysfunction by Strain echo in Primary Hyperparathyroidism and its reversal after parathyroidectomy**

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*PGIMER*

**Introduction**

Primary hyperparathyroidism (PHPT) has a high incidence of hypertension, left ventricular hypertrophy (LVH), valvular calcification and myocardial calcification. The strain echocardiography is a highly sensitive modality as decrease in Global Longitudinal Strain (GLS) is found in the earlier stage of myocardial disease. Therefore, we aim to evaluate any subclinical left ventricular dysfunction in PHPT patients with myocardial strain imaging in addition to conventional echocardiography and to look for its reversal after parathyroidectomy (PTx).

**Methods:**

Thirty patients who underwent curative parathyroidectomy for PHPT were included. All patients were evaluated with M mode echo, 2D echo and strain imaging before and 6 months after PTx. Left ventricular ejection fraction (LVEF), left ventricular diastolic dysfunction, LVH, GLS and global circumferential strain (GCS) were recorded.

**Results**

On M mode echo, LVH was present in 15 of 30 patients preoperatively and 8 of these showed complete improvement and 1 patient showed mild improvement after PTx (p<0.038). On 2D ECHO, 3 patients had systolic dysfunction; and all of them improved at 6 months after surgery (p=0.083). Diastolic dysfunction was present in 4 patients and 3 of them showed improvement (p=0.083). On strain imaging, impaired myocardial contractility (impaired systolic function) with GLS>18% was found in 14 patients and 9 patients had abnormal GCS >18%. However, six month following parathyroidectomy 6 of 14 patients with abnormal GLS showed significant improvement (p 0.034). Similarly, 2 of 9 patients with abnormal GCS demonstrated improvement following surgery.

Compared to conventional 2D echo, strain imaging showed high detection rate as 36.7% more patient were found to have subnormal cardiac function. Incidence of systolic and diastolic dysfunction on 2D echo was 10% and 13.3% respectively; while myocardial strain imaging showed impaired systolic function in 46.7% patients.

Serum PTH and change in GLS as well as GCS following PTx demonstrated a strong positive correlation (p 0.013, p 0.126) while serum calcium showed a weak correlation with change in GLS and GCS following surgery.

**CONCLUSION**

In this study, strain imaging was more valuable than routine 2D echo in evaluation of cardiac dysfunction. We suggest that myocardial strain imaging should be considered as a part of preoperative workup in PHPT patients because it aids in early detection of subclinical left ventricular dysfunction.



**FP-7-4****Outcomes of Parathyroid Cancer in A Southeast Asian Cohort**

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**Background**

Parathyroid carcinoma (PTTC) is a rare entity and is an unusual cause of primary hyperparathyroidism. Incidence of PTTC has been rising with 6.6 cases per 10 million and is attributed to early diagnosis. The mainstay of treatment is radical surgery with en bloc resection of disease but recurrences are common and almost halve the survival in these patients.

**Methods**

All patients who underwent parathyroid surgery during 2000 – 2021 at National University Hospital, Singapore were assessed. Patients with PTTC were selected and their symptomatology, biochemical profile, imaging, treatment modalities, and outcomes were analyzed.

**Results**

735 patients had surgery of the parathyroid and 7 (0.9%) were for PTTC. The mean age of the patients was 63 (range 36 – 89), with the female: male ratio being 4:3. A palpable neck mass was detected in 3 (42.8%) patients. All 7 of them presented with hypercalcaemia and 6 patients had very high PTH. Peak pre-operative PTH was recorded as 85.85pmol/L and the highest ionized Calcium was noted as 3.32mmol/L. Ultrasound neck and MIBI were performed on all resulting in only 1 false positive report. Five patients underwent en bloc excision while the other two had focussed parathyroidectomy. Recurrences were recorded in 2 (28.5%) patients treated with a focussed approach. One patient had downstream lung metastasis twice and underwent VATS resection to clear the disease; however, the patient continued to be hypercalcaemic and subsequently started on cinacalcet therapy. The second patient had four surgeries to clear out parathyromatosis and is currently disease free. After a mean follow-up of 7 years, one died of progressive cardiac disease.

**Conclusions**

Parathyroid carcinoma continues to be an uncommon cause of primary hyperparathyroidism and the best cure is achieved with en-bloc excision.

**FP-7-5****IDENTIFYING PATIENTS WITH ASYMPTOMATIC HYPERPARATHYROIDISM BY SERUM CALCIUM AND VITAMIN D SCREENING**

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**INTRODUCTION**

Primary hyperparathyroidism (PHPT), the most common cause of hypercalcaemia is caused by solitary parathyroid adenoma in 85-90% of patients. Often, patients with hyperparathyroidism are asymptomatic. However, early parathyroidectomy in select patients of asymptomatic hyperparathyroidism prevents the occurrence of various conditions like recurrent nephrolithiasis, recurrent acute pancreatitis, hypertension, deteriorating kidney, bone and mental health and complications thereof. Surgery obviates the need of prolonged monitoring, thereby reducing financial burden as well. Therein lies the importance of detecting asymptomatic hyperparathyroidism in the population.

**PATIENTS AND METHODS**

Serum calcium and Vitamin D3 levels were measured in 6000 patients attending the outpatient department of our institute between January 2021 and May 2022. Known cases of hyperparathyroidism, those with any condition altering serum calcium levels (CKD, carcinoma) and those on calcium and/or Vitamin D3 supplements were excluded.

Patients with normocalcemia and decreased Vitamin D3 were subjected to correction of Vitamin D3 and the tests were repeated after 2 months. In cases with hypercalcaemia, serum phosphate and intact parathormone (iPTH) was measured. If serum iPTH came out to be more than the maximum iPTH as per standard nomograms, the diagnosis of hyperparathyroidism was done followed by gland localisation and surgery.

**RESULTS**

Out of the 6000 patients screened, 5112 (85.2%) had normal/low calcium levels with decreased Vitamin D3 levels and 3 had hypercalcaemia with normal/low Vitamin D3. After Vitamin D3 correction in those 5112 patients, 2 more were found to have hypercalcaemia. Serum phosphate and iPTH levels were then measured in those 3+2=5 patients. Out of 5, 3 had high serum iPTH along with low serum phosphate. Gland localisation was done in them followed by surgery. The other 2 patients had borderline iPTH values with low 24-hour urinary calcium levels. Prevalence of asymptomatic hyperparathyroidism in our study population was 0.05% (3/6000). During this period, we encountered 19 cases of PHPT (16 operated after localisation, 1 refused surgery, 2 had failure of localisation) out of which 3 were asymptomatic [15.8% (3/19)].

**DISCUSSION**

Literature states incidence of asymptomatic hyperparathyroidism in the population to be 1% globally and 5% of patients with PHPT to be asymptomatic in India. In our study, we found the overall incidence of asymptomatic hyperparathyroidism to be 0.05% and 15.8% of our patients of PHPT were asymptomatic.

### FP-7-6

#### Bilateral neck exploration and the cure rate after surgery: a five-year trend

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**Background.** Focused parathyroidectomy (FPTX) is widely considered to be a standard treatment for primary hyperparathyroidism (PHPT). The use of bilateral neck exploration (BNE) is generally limited to the cases with no localized adenomas or the cases suspicious for multiglandular disease (MGD). There are studies showing that the routine use of BNE is able to increase the cure rate, but the evidence is scarce and controversial.

**Materials and methods.** A retrospective cohort study included 2494 cases of patients with PHPT who underwent initial surgical treatment at SPBU Hospital from January, 2017 till December, 2021. Indications for surgery and diagnostic protocols were the same during the observed period. Patients with recurrent PHPT and metastatic parathyroid carcinoma were excluded. Serum PTH and ionized calcium (iCa) levels were assessed before and after the surgery. Patients with elevated iCa and PTH levels after the initial surgery and patients who were reoperated for PHPT within following 6 months were considered as having a persistent PHPT. Cases with MGD were defined as the cases with more than one histologically confirmed parathyroid adenoma excised during the initial surgery or the cases with the persistence of PHPT following the excision of a single parathyroid adenoma.

**Results.** A monotonous increasing trend in the percentage of BNE of total number of the operations and a decreasing trend in the rate of persistent PHPT were found during the observed period with a strong negative correlation ( $r = -0.92$ ). The overall rate of persistent PHPT was significantly lower in 2021 than in 2017 (1.6% vs 6.8 %,  $p < 0.001$ ) as well as the rate of persistent PHPT among patients with MGD (13.2% vs 58.0 %,  $p < 0.001$ ). The prevalence of MGD, the rate of the patients with preoperatively performed 4D CT and the rate of persistent PHPT among non-MGD patients did not differ significantly over the years.

**Conclusion.** A routine use of bilateral neck exploration can decrease the rate of the postoperative persistence of PHPT by better identifying of MGD, though further investigations are required.

### FP-7-7

#### Quality of life in patients with primary hyperparathyroidism without surgery

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#### Introduction

Management of “asymptomatic” primary hyperparathyroidism (PHPT) has been controversial. While the guidelines for the management of asymptomatic PHPT proposed by the Fourth International Workshop can be signposts in clinical practice, they also recognize unresolved issues key to the shared-decision making. Some studies have shown that surgical treatment could improve patients' quality of life (QoL), even in cases that were considered asymptomatic. However, a systematic review has discussed that the observed changes could be explained by factors other than surgery. We conducted a cross-sectional study to evaluate the QoL and self-reported symptoms in patients with PHPT without surgery.

#### Material and methods

PHPT patients being followed up in our department without surgery participated in the present study. We asked the patients to fill-out two questionnaires twice, immediately after the outpatient consultation and two weeks later. The instruments included the Short-Form 36 version 2 (SF-36v2) and Parathyroidectomy Assessment of Symptoms (PAS) Scale. The SF-36v2 uses the norm-based scoring (NBS) approach for each subscale with a mean of 50  $\pm$  10 [SD], referring to the national norms stratified by gender and age group. Thirteen items of the PAS score utilize a visual-analog scale ranging from 0 (not at all) to 100 (very severe). We described a summary statistic of each item of the PAS score. Finally, we examined the test-retest reliability of the two instruments.

#### Results

Twenty-four (female/male = 15/9) patients were included with a median (range) age of 65.5 (35-86) years. The follow-up duration ranged from 0.9 to 17.7 with a median of 8.0 years. The medians (ranges) of serum calcium and intact PTH levels were 10.6 (9.9-11.6) mg/dL and 121.5 (65-753) pg/ml, respectively. The norm-based mean (SD) values for 3 component summary scores of the SF-36v2 were 48.48 (7.90) for PCS, 55.40 (8.48) for MCS, and 49.00 (9.83) for RCS, respectively. Furthermore, scores of the following subscales were significantly higher than those of the general population: general health ( $p=0.048$ ), vitality ( $p=0.0062$ ), mental health ( $p=0.02$ ). Test-retest correlation coefficients were statistically significant in the full items of the PAS and 2 of the 3 component summary scores of SF-36v2.

#### Conclusion

QoL is not necessarily impaired in patients with PHPT managed without surgery.

### FP-8-1

#### Surgical management of Insulinoma: Two-decade experience in north India

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**Introduction:** Pancreatic neuroendocrine tumors are rare tumors consisting of 1-2% of all pancreatic tumors. The majority of these are nonfunctional. Among the functional tumor, Insulinoma is the commonest tumor with varied presentation. Due to the rarity of the tumor, diagnosis and management has always been the dilemma.

**Aim:** To analyze the clinical presentation, localization techniques and surgical outcome of insulinomas diagnosed and operated in last two decades.

**Methods:** Retrospective data of patients who were diagnosed to have insulinoma and underwent surgery in our institute from May 2002 to 2022 were included in this study.

**Results:** Overall 38 patients of mean age 46.93 years [ 20 female (52.63%) ; mean age 48.55 years and 18 male (47.37%); mean age 42.55 years ] were included in this study. Among these patients 57.89% patients had tumors localized to the body and tail region. Most patients i.e., 60.52% reported have tumor size less than 2.0 cm. There were 6 (15.78%) multiple insulinomas, three associated with multiple endocrine neoplasia type I. There were 4 patients (10.5%) presented with MEN associated insulinoma and the rest (89.47%) had sporadic tumors. Two patients(0.5%) had malignant insulinomas, presented with metastases out of which one is sporadic and one is MEN I associated. 33 patients (86.8%) are preoperatively diagnosed by CECT and MRI abdomen, the other 5 patients required either arterial stimulation venous sampling or an endoscopic ultrasound. There are 4 patients (10.53%) who presented with seizures preoperatively. All the patients underwent surgery following intraoperative ultrasonogram and bidigital palpation [ enucleation (36.8%), distal pancreatectomy(39.4%), subtotal pancreatectomy, (21%) and one patient required PPPD. All the patients who had MEN associated insulinoma with multifocal tumors had undergone subtotal pancreatectomy. Two patients had undergone excision of liver metastases from a malignant insulinoma and remained asymptomatic with medical therapy. The average blood glucose level post-surgery reported to be 149.63 mg/dl. Surgery achieved cure in all patients (100%).

**Conclusions:** The insulinomas are usually benign, small, solitary effecting mainly younger females, usually localized by CECT & MRI abdomen, in body and pancreatic tail. Intraoperative ultrasound and bi-digital palpation are useful adjuncts to localize the tumor. Enucleation and Distal pancreatectomy are the most performed surgical techniques with which we have achieved a high cure rate and acceptable complication rates.

**Keywords:** insulinoma, retrospective, MEN, Enucleation, Distal Pancreatectomy

### FP-8-2

#### Robotic Adrenalectomy Using da Vinci SP Robotic System; Technical Feasibility

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**Background:** Laparoscopic adrenalectomy is the gold standard for adrenal tumor. However, robotic adrenal surgery has gained interest recently. For minimally invasive surgeries, we first reported on robotic adrenalectomy using a single-port access performed by da Vinci multi-arm robotic system (RA-SA) in 2011. Since its introduction in 2018, we first performed robotic adrenalectomy using the da Vinci SP robotic system in 2020. We aimed to introduce the novel single-port robotic system (RA-SP) for adrenalectomy and evaluate its technical feasibility by comparing it with the surgical outcomes of patients who underwent robotic adrenalectomy with RA-SA.

**Methods:** Eight patients who underwent robotic adrenalectomy using RA-SP from February 2020 to June 2021 were compared with 11 patients who underwent RA-SA from 2011 to 2015 by a single surgeon.

**Results:** The two groups were similar in their age, sex, body mass index, the type of operation, and final pathologic diagnosis. Despite no significant differences, RA-SP resulted in moderately less mean operation time, estimated blood loss, and the length of hospitalization.

**Conclusions:** Da Vinci SP robotic system is a novel, safe, and feasible technique to improve the convenience of operation and cosmetic effect for adrenalectomy.

### FP-8-3

#### **Pediatric Pheochromocytoma & paraganglioma: Three Decades Experience in a Tertiary Centre in India**

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**Background:** Pediatric pheochromocytoma (PCC) and paraganglioma (PGL) are rare clinical entities. We present our experience of managing these at a tertiary referral center in India.

**Methods:** This retrospective study (Sep1989 to Aug 2019) consisted of 57 pediatric patients (<18years) with PCC and PGL. Clinico-pathologic variables, perioperative events operative and follow-up details were recorded.

**Results:** Mean age of presentation was 14.2 (+4.9) years and boys outnumbered girls (1.3:1). Mean duration of symptoms was 12months (range: 1-60 months). Classic clinical triad was observed in 47.4% patients, hypertensive crisis in 19.3% and cardiomyopathy in 3.5%. Only two familial patients were asymptomatic. Familial association was noted in 21.1% (VHL-11, MEN 2A- 3, MEN 2B- 1). Two children had overt medullary thyroid carcinoma at the time of presentation. Bilateral and malignant PCC was present in 22.8% and 7% patients respectively. 57 children underwent 60 procedures for PCC (53) and/or PGL (7). Bilateral adrenalectomy was performed in 22.8% (Cortical sparing in 8.7%). One third of patients had minimally invasive surgery. All PGL were intra-abdominal (perirenal-3, organ of zuckerkindl-1, urinary bladder-1, aortocaval- 1). Mean post-operative stay was 8.6 (+4.9) days. Three children had post op fever, two had wound infection, one each developed septicaemia and pulmonary edema. Median follow-up was 16.5 months (6-32). Recurrence was noted in 3 children (Contralateral PCC-2, PGL-1) who underwent successful re-operation.

**Conclusions:** Incidence of familial disease increase with routine genetic testing in children with PCC. Long- term follow up is essential for detecting recurrences and other components of familial disease.

### FP-8-4

#### **Mutations in Syndromic Functional PPGLs in a South East Asian Cohort**

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#### **Background**

About 25% of the patients with Pheochromocytoma/Paragangliomas (PPGLs) are inherited. We aim to present the outcomes of patients with syndromic PPGLs in a South East Asian cohort treated in a tertiary institution.

#### **Methods**

38 patients underwent treatment for PPGLs at National University Hospital over the period 2010 – 2020. Biochemical, radiological, and clinicopathological variables were assessed along with the genotypes of the underlying condition.

#### **Results**

13 (34%) patients were found to have a germline mutation with a median age of 32 years (Range 18-75). Gender distribution was nearly equal (7M:6F). The germline mutations were: SDHB – 6 (46%), RET (MEN2A Codon-634) in 3 (23%) and 1 case each of MEN 2B (M918T), SDHD, VHL and Variant of Unknown Significance (VUS). Eight patients had adrenal PPGL with 5 presenting bilateral disease and 2 having multifocal disease.

Twelve patients were treated surgically of whom 4 underwent laparoscopy (2 anterior and 2 retroperitoneal approach). One patient chose not to have surgery in view of his significant comorbidities. At follow-up, 3 patients were found to have metastatic disease (bones and lung mets in 2 and in liver mets in the other). After a mean follow-up of 5 years, 2 of 13 (15%) died of progressive disease.

#### **Conclusions**

SDH mutation is the prevalent genotype of inherited patients with PPGL in our cohort which is higher than reported series worldwide.



### FP-8-5

#### Reduced Uptake Pattern on <sup>68</sup>Ga-DOTATATE-scan May Represent Aggressive Behavior in PPGLs

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##### Background

Predicting malignancy among Pheochromocytoma and Paraganglioma (PPGLs) remains a challenge, with only a limited understanding of the clinical and molecular characteristics. Pre-operative work-up includes a DOTATE-scan, to assess for local and distant disease, as PPGLs express somatostatin receptors enabling imaging with Ga-68 DOTA-coupled peptides. The suggestion that reduced avidity of PPGL on DOTATATE-scan could be a sign, not only of altered metabolic activity but also of increased biologic aggressiveness, possibly due to loss of SSTR (Somatostatin Receptor) expression.

##### Methods

Six patients underwent treatment for their PPGL, which displayed signs of malignancy based on a high PAS-score or recurrent invasive/metastatic disease. The tumors were only mildly avid on pre-operative DOTATATE-scan. One patient underwent laparoscopic right adrenalectomy, four patients had open surgery and one patient decided against surgery and succumbed to his invasive aortic paraganglioma.

##### Results

The patient who underwent laparoscopy had a 7cm Pheochromocytoma with a PAS-score of 3. He underwent an open right hepatectomy after 2 years due to a recurrence. No germline mutations were identified in him. Two out of four patients who underwent open surgery had SDHB-mutation (Deletion-Exon 1) with bulky vascular tumours of 6cm and PAS-scores of 7. Both were left adrenalectomies and their urinary PPGL screening normalized post-surgery. They remain under stringent follow-up and are devoid of disease at present. The other open surgeries consisted of a child who had an aortic paraganglioma (PAS-score 5) and a patient with thoracic paraganglioma (PAS-score 3). All patients had poor uptake on Ga-DOTATE and continue to be followed with FDG-PET. Two patients developed downstream metastasis to the spine within 6 months of surgery and had radiotherapy.

##### Conclusions

Although DOTATE-scan is considered the gold standard functional imaging modality, some PPGLs are only mildly avid, possibly due to a degree of dedifferentiation and therefore loss of SSTR expression. A non-highly avid tumor suspected to be a PPGL should be considered as possibly having more aggressive tumour biology. Although in general, a staging DOTATE scan will provide adequate evidence in the workup of this disease, there might be a subgroup of patients in whom FDG scan should be considered to gain additional information.

### FP-8-6

#### Partial adrenalectomy: a single institution series of 688 cases

Polina Knyazeva, Martin Karl Walz

*Evang. Kliniken Essen Mitte*

##### Introduction

Partial adrenalectomy, as an organ-sparing surgery, increases its popularity during the last decade and becomes a golden standard for many adrenal pathologies. It is associated with the potential preservation of adreno-cortical function and is essential for hereditary diseases. In this study, we collected and analyzed our experience in retroperitoneoscopic partial adrenalectomy.

##### Patients and Methods

In total 688 partial adrenalectomies were performed using a retroperitoneoscopic approach between January 2010 and August 2022 at the Kliniken Essen-Mitte (Essen, Germany). Of the total number of 637 patients, 51 patients underwent bilateral partial resection. There were 382 female and 255 male patients with a mean age of 49,6 (range: 10 - 85). The mean tumor size was 2,7 (ranged 0,5-15). The data (age, gender, diagnosis and histology, tumor size, operating time, mean hospital stay) was prospectively collected and retrospectively analyzed. The retroperitoneoscopic adrenal resection was performed using a standard technique. The transaction of the adrenal gland was performed with the LigaSure device.

##### Results

From 688 partial adrenalectomies, 218 were performed due to Conn's syndrome, 105 Cushing's syndrome, 242 pheochromocytoma, 54 adrenal adenoma, 31 adrenal metastasis, and 34 due to other benign adrenal pathologies. The median operating time was 60 (ranging from 15 to 210) minutes. There were 154 tumors larger than or equal to 4 cm. There was no perioperative mortality or major complication. The minor complication included isolated cases of postoperative hematoma, relaxation, and dysaesthesia of the flank, incisional hernia. The blood loss was negligible with a maximum of 110 ml and the mean hospital stay was 3 days.

##### Conclusion

Retroperitoneoscopic partial adrenalectomy is a feasible and safe procedure with a low complication rate. It is the preferred operation for patients with benign pathologies, as well as in cases with bilateral disease. The size of the tumor more than 4 cm is not a contraindication for this procedure.



### FP-9-1

#### **Adrenalectomy in Children is it different**

Sarrah Idrees, Sabaretnam Mayilvaganan, Ankur Mandelia  
*SGPGIMS*

We present video of Laparoscopic Adrenalectomy in 2 children followed by our experience in 10 children.

### FP-9-2

#### **Use of Indocyanine and fluorescein green dye for parathyroid localization and perfusion study**

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There are many ways to check for parathyroid gland localization and its perfusion status while doing thyroidectomy or parathyroidectomy. I have used Indocyanine green [ICG] dye in a nine years old child with a large multinodular goiter undergoing total thyroidectomy, a fifty years old lady undergoing unilateral parathyroidectomy to localize parathyroid adenoma and the same side normal parathyroid gland. I have also used poor man's dye Fluorescein green [FD] dye for the same purpose, it is low cost (< one \$ compared to high cost in ICG use), easily available, safe, and efficacious for localizing and checking the vascularity of parathyroid glands. This is an innovative technique and it can be used when the cost is a problem in resource-constrained countries and ICG dye may not be available or affordable. It does not require any monitor or laser light. FD is visualized in blue light and its identification rates correlate with postoperative hypocalcemia. FD 2ml is injected in the antecubital vein after removal of the thyroid specimen, operating room lights are switched off, blue light is switched on and within 2 minutes we can visualize the green-colored parathyroid glands which denote its vascularised state. In ICG dye, we need to inject 1- 2ml of dye diluted in sterilized water in the antecubital vein and then see the color changes in the parathyroid glands with help of laser light and switching on the monitor. In ICG dye there are various modes like non-ICG mode, ICG mode, contrast mode and color segmentation modes. We can score objectively the perfusion status of the parathyroid glands based on color black, grey or white using ICG dye. In patients with mild or asymptomatic hyperparathyroidism, often we find it difficult to localize the small parathyroid adenomas and who are negative on MIBI scan imaging. ICG dye also helps in such cases to pick up the parathyroid adenomas which are seen as green color due to their highly vascularised status.

**FP-9-3**

**Indocyanine green angiography for Intra-operative visualization of Parathyroid glands**

Abhishek Krishna, Yuvraj Devgan, Amit Agarwal

*Sanjay Gandhi Post Graduate Institute of Medical Sciences*

**Introduction:** Temporary hypoparathyroidism with resulting hypocalcemia is the most common complication after total thyroidectomy and occurs in up to 30% of patients who undergo total thyroidectomy. Mere visualization of parathyroid glands intra-operatively does not ascertain its vascularity and functionality, so Indocyanine green angiography may help in this aspect.

**Procedure:** We have used SPY-PHI (copyright Stryker) Fluorescence camera for the video. There are three modes of visualization: (i) Overlay mode: ICG areas appear green in colour and non ICG areas appear normal, (ii) Spy color segmentation mode: in which ICG areas appear from blue to red depending on degree of vascularity (iii) Spy contrast mode: in which ICG areas appear white while non-ICG areas appear black. Scoring was done in contrast mode from 0-2 depending upon the vascularity.

**Conclusion:** The video demonstrates the utility of ICG angiography in the identification of well vascularized parathyroid glands which may further help in prediction of post-operative hypocalcemia.

**FP-9-4**

**Neuromonitoring with Automatic Periodic Stimulation in large goitres**

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The video demonstrates steps of total thyroidectomy with APS (Automatic periodic stimulation). The recommended management of huge thyroid tumor is surgery especially with compressive symptoms. However, it is possible that surgical complications, such as recurrent laryngeal nerve injury, hypocalcemia and hemorrhage, are higher than in small goiters because of anatomical changes, difficulty of surgical approach and difficult intubation.

The video demonstrates two cases of huge thyroid tumor along with continuous neuromonitoring and awake fibreoptic intubation as adjunct.

Both the cases were intubated using neuromonitoring tubes. Vagal electrode was placed over lower part of vagus. The current used was 0.8 milliampere to 1 milliampere in order to achieve the amplitude of more than 350mv.

If nerve is stretched (traction injury), thermal injury, compression, clamping or ligation then the equipment sends both visual and audio alarm if the amplitude decreases to more than 50% or latency increases to more than 10%. Events with amplitude less than 100microvolts was recorded as loss of signals.

The events (alarm) were recorded as single events if only amplitude decreased or latency increased or combined events if both. Multiple events were recorded during the handling of large goitre but in none it continued for more than 1 minute after relieving the stretch on the nerve and thyroidectomy was completed with no loss of signals

Post operatively both patients recovered with no complications.

CIONM can alert the surgeon whenever the nerve is unduly stretched so that immediate corrective measure can be taken, thus avoiding permanent RLN damage.

### FP-9-5

#### **Cosmetic Infra-mandibular Hyoid level incision, Ligature-Less thyroidectomy with neck lift, an Original Technique**

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A high neck skin crease incision at the level of the Hyoid, a flexural area and in the shadow of the face and chin is not seen. Addition of neck lift provides better cosmetic results than endoscopic thyroidectomy or open surgery through incision in the lower second or third skin crease of the neck. This approach is not suitable for Radical neck dissection, extended resection or if Sternotomy is required. In patients with previous Thyroid surgery the old surgical scar is used.

For Total or Hemi Thyroidectomy an incision is made at the level of Hyoid in the upper most skin crease in the anterior aspect of the neck. Its size (5 to 10 cms.) depends on the size of goitre. The largest goitre weighed 775 gms. No skin flap is raised thus avoiding postoperative anaesthesia or paraesthesia. Investing layer of the deep fascia is cut in the midline to increase the exposure. Strap muscles are retracted or cut with ultrasonic shears. Pyramidal lobe and right or left upper pole of thyroid are dissected first, using ultrasonic shears even for sealing the vessels, preserving the External branch of the superior laryngeal nerve (EBSLN), followed by division of the isthmus when uninvolved. The lobe is mobilized with identification of both Parathyroids and the recurrent laryngeal nerve (RLN) at its entry into the Larynx. Nerve monitoring is being used in recent years. Parathyroid Auto fluorescence has not been used yet to check vascularity of Parathyroids as we have not yet acquired the fluorescence imaging devise. The RLN, Parathyroids and their vascularity are preserved. The lower pole and any extension including any sub-manubrium-sternal extension are finally dissected using mild traction on the lobe. The other lobe is similarly dissected in an ante-grade sequence. A flat suction drain is routinely used. For large goitres and those with lax neck skin, classical neck lift is done by tightening the deep fascia in the midline and removing excess skin along incision margins during closure. Closure is completed in four layers – strap muscles, fascia, subcutaneous, subcuticular, with a 3-0 absorbable (poliglecaprone) suture with cutting needle. A complete single piece specimen is sent to the pathologist. Minimal or no residual thyroid tissue is found on postoperative radioactive Iodine scan even in the presence of retrosternal goitre.

### FP-9-6

#### **The contributing factors for the difficulty of endoscopic thyroidectomy during the initial period**

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#### Background

In Japan, the number of endoscopic thyroidectomy is increasing after the national health insurance coverage. To initiate endoscopic thyroidectomy safely, operative indication is essential. The reference on the contributing factors for the difficulty of endoscopic thyroidectomy during initial period is limited.

#### Methods

The initial 45 patients who underwent endoscopic thyroidectomy from subclavian approach were included in this study. The difficulty of operation was evaluated by the operative duration. The contributing factors for the operative duration were analyzed by logistic regression analysis using patient characteristics, thyroid tumor size preoperatively evaluated by imaging diagnosis, laterality of lobectomy, and preoperative diagnosis by fine needle aspiration cytology. Additionally, ROC curve analysis was used to investigate the tumor size contributing the operative duration within 3 hours.

#### Results

The median operative duration and blood loss were 159.0 minutes (125.0-178.0 minutes) and 5.0ml (0-10ml). In the univariate analysis, significant differences were identified in the thyroid tumor size, laterality of lobectomy, and body mass index. In the multivariate analysis, significant difference was identified in the thyroid tumor size (B=1.270, P=0.004, 95%CI 0.438-2.102). ROC curve analysis revealed the the cut off value for the operative duration within 3 hours was 35.2mm (AUC 0.733, 95%CI 0.562-0.903).

#### Conclusion

The difficulty of endoscopic thyroidectomy during the initial period might be affected by the thyroid tumor size, not by body mass index and laterality of lobectomy. To initiate the endoscopic thyroidectomy safely, operative indication of thyroid tumor size around 35mm might be appropriate.

FP-9-7

**Safety and feasibility of single-port adrenalectomy using the da Vinci SP robotic system**

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Laparoscopic adrenalectomy has become a standard surgical treatment option for patients with benign adrenal diseases. Recently, efforts are ongoing to minimize the invasiveness of the procedure and to reduce the number of port sites. This study was to demonstrate of our experience of single-port posterior retroperitoneal adrenalectomy (PRA) using da Vinci SP robot system and evaluate its technical feasibility and surgical outcomes.

From January 2016 to February 2022, we compared 17 patients who underwent single-port PRA using da Vinci SP robotic system, 103 patients who underwent reduced-port (two-port sites) PRA and 117 patients who underwent conventional 3-port PRA using da Vinci Xi robotic system. The clinic-pathological features and surgical outcomes were compared in these two groups.

No major complications were observed, and there was no patient who were converted open surgery or needed additional port insertion in both groups. Tumor size, patients' body mass index, hospital stays, operation time, and pain score did not differ significantly among these two groups.

Single-port PRA using robot SP system was safe and feasible. This could be a good alternative conventional three-port or reduced port PRA for adrenal tumors in certain situations.

FP-10-1

**Use of Lenvatinib in neoadjuvant setting to achieve total thyroidectomy for inoperable FTC**

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60-year-old gentleman complained of anterior neck swelling for 22 years for which he was operated. Histopathology was suggestive of follicular thyroid cancer. However, there was recurrence of anterior neck swelling 4 years after surgery for which he received radiotherapy and then later re-excision of swelling. He again developed recurrence which ulcerated also. The growth continued to increase slowly with occasional episodes of hemorrhage from the swelling. Subsequently the patient consulted Endocrine surgery OPD. On examination, patient had ulceroproliferative mass measuring 9\*5cm fixed to the underlying muscles. Patient also had high ft4 and low TSH, hence started on neomercazole. CECT revealed a locally advanced thyroid mass: CECT showed ulceroproliferative mass in anterior cervical space posteriorly infiltrating bilateral strap muscles and abutting thyroid gland with loss of fat planes. It was also infiltrating into b/l sternocleidomastoid muscle (R > L) with indistinct fat planes with right IJV. In view of an inoperable mass the patient was started on Lenvatinib 10 mg which was gradually increased to up to 20mg per day for a period of 5 months. Patient was able to tolerate it well without need for discontinuation. He showed good response with Lenvatinib with tumor reduction upto 40% percent and hence planned for surgery. Patient was then planned for surgery after 5 months of Lenvatinib. Intraoperatively tumor was adhered to the strap muscles and sternocleidomastoid. IJV was reached via posterior approach. Bilateral recurrent laryngeal nerves were identified and preserved. Primary closure was done. Histopathology was suggestive of widely invasive follicular thyroid carcinoma. Patient is now planned for RAI treatment.

Lenvatinib and other TKI's are being used in locally advanced thyroid cancers like poorly differentiated and anaplastic as well as in radio refractory DTC. However, their role in neoadjuvant setting for differentiated thyroid cancers is being increasingly explored but there are only anecdotal reports in literature that too only for PTC. Our case seems to be the first case where it was used in follicular thyroid cancer in the neoadjuvant setting.



### FP-10-2

#### Challenges in operating such monstrous goitres even in this era?

Sarrah Idrees, Sabaretnam Mayilvaganan

*SGPGIMS*

A 45-year-old lady from the Iodine - deficient Himalayan belt presented to us with a gradually progressive, painless goiter for more than 20 years. Such goiters were common in her village. She neither had symptoms of hyper or hypothyroidism nor any compressive symptoms. She had four living issues and as per her, the goiter would increase in size during the second trimester of each pregnancy.

On examination, she had a huge thyroid swelling involving both lobes and isthmus, measuring 20 cms with dilated veins over the swelling. The swelling was firm in consistency, moving with deglutition and had no retrosternal extension. There was no cervical lymphadenopathy.

The diagnosis of an euthyroid multinodular goitre was made. Thyroid profile was normal; however, vocal cords could not be visualized during video laryngoscopy. CECT should retro tracheal extension.

She underwent total thyroidectomy under General anesthesia. A 2-kilogram goiter was excised in toto, and the surgery lasted for 8 hours. Bilateral recurrent laryngeal nerve and all four parathyroid glands were identified and preserved. However, intraoperatively she was found to have tracheomalacia hence, tracheostomy was done.

She developed biochemical hypocalcemia on POD 2 and was started on oral calcium and vitamin D supplementation to which she responded well and became eucalcemic. Video laryngoscopy on POD 4 showed U/L paresis so tracheostomy care was continued. Video laryngoscopy on POD 12 showed bilateral vocal cords mobile, hence, she was weaned off tracheostomy gradually and was decannulated successfully on POD20. During the ICU stay patient developed ICU psychosis and required psychiatric care. Histopathology was reported as multinodular goitre.

She now has normal voice, is eucalcemic and on thyroxine replacement.

This case highlights the importance of thorough counselling of such patients with long standing goitre as these can cause tracheomalacia. Surgery in such cases requires utmost patience and always requires holistic hospital care by a multidisciplinary team. We almost lost the patient because of ICU psychosis when she became violent and tried to remove the tracheostomy tube by herself. Since these women are never exposed to hospital environment, she developed psychiatric rage and had to be treated accordingly.

### FP-10-3

#### Experience with recurrent cases of parathyroid carcinoma

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The prevalence of parathyroid carcinoma is extremely rare in the United States, at 0.15 per million population. Surgery is performed when local recurrence is resectable, but there is no standard drug therapy for distant recurrence. When hormone secretion from the site of recurrence is high, hypercalcemia must occur, which is difficult to control. I would like to report two cases of recurrent parathyroid carcinoma in our hospital and discuss the treatment of recurrent parathyroid carcinoma. The two cases were both operated on at other hospitals and developed distant or local recurrence during follow-up.

In the first case, each of the multiple pulmonary metastases was small enough that a tissue sample was not available to allow comprehensive genomic profiling (GCP) to be performed. At the time of referral, the hypercalcemia was very severe and the patient was barely able to take oral intake. His general condition was also poor, and we hoped that central venous nutrition at home with an implanted CV port would improve his general condition, but he passed away without any further treatment.

The second case was referred to our hospital due to local recurrence. Because of concerns about tracheoesophageal fistula, surgical treatment and radiotherapy were avoided. The hypercalcemia was controlled with a calcium receptor agonist (calcimetics), and the tumor did not enlarge, so the patient was followed up. The hypercalcemia worsened during the course of the treatment, and the patient wished to receive some therapeutic intervention. The tumor did not worsen during the course of treatment, but the patient's progress was affected by persistent hypercalcemia.

How blood calcium is controlled may determine the prognosis and quality of life of patients with recurrent parathyroid disease.



**FP-10-4**

**Severe symptomatic and Asymptomatic PHPT: Tale of two giant parathyroid adenomas**

Sanjay Kumar Yadav

*NSCB Medical College, Jabalpur*

**Introduction:**

Giant parathyroid adenomas are rarely reported now. Herein we are reporting two cases of one of the largest parathyroid adenomas in literature with two different presentations.

**Cases:**

Case 1: A 42 years female presented with severe symptomatic PHPT. 4D CT scan revealed right inferior parathyroid adenoma reaching up to arch of aorta which was removed via cervical route. It was 7x6 cms.

Case 2: A 65 years female presented with dyspnoea while walking. She did not have any symptom of PHPT and serum calcium was normal. She had multinodular goitre clinically. A CT neck revealed MNG with right inferior parathyroid adenoma reaching up to arch of aorta and compressing trachea. Total thyroidectomy with right inferior parathyroidectomy was done. Parathyroid adenoma was 8x7 cms.

**Conclusion:**

Giant parathyroid adenomas are rare and non-functional ones are extremely rare. But it should be kept as differential when evaluating neck masses.

**FP-10-5**

**Dilemma of an Adrenal Tumor in Virilising Females on Background of Congenital Adrenal Hyperplasia**

Abhishek Krishna, Amit Agarwal, Sushil Gupta,  
Sanjay Surekha

*Sanjay Gandhi Post Graduate Institute of Medical Sciences*

Case 1: A 30-year-old patient brought up as male presented to us with a huge abdominal mass. He was born with genetic ambiguity out of consanguineous marriage. On examination he had hirsutism and ambiguous genitalia: phallus size 7 cm, chordee, with proximal penile hypospadias, no palpable gonads and complete labioscrotal fusion. Hormonal work-up was suggestive of classical simple variant of Congenital Adrenal Hyperplasia (CAH). Karyotype was 46 + XX. CECT revealed bilateral adrenal masses: (Right-6 cm, Left- 43x34 cm). He underwent staged bilateral adrenalectomy along with hysterectomy and bilateral salpingo-oophorectomy. Left adrenal mass weighed 8.8 kg and right weighed 750 gm. HPE was suggestive of adrenal oncocyctic neoplasm of uncertain origin. Patient is doing well on last follow-up.

Case2: A 22-year-old lady was referred to us with a right suprarenal mass. On examination she was found to be having signs of virilization-hirsutism (ModifiedFerriman-Gallwey score of 22), clitoromegaly (clitoral index of 450 mm<sup>2</sup>). Hormonal work-up revealed that she was a case of CAH and because of late onset of virilizing signs and symptoms she was labelled as non-classical CAH. She underwent laparoscopic right adrenalectomy and HPE was suggestive of adrenal adenoma.

The main differential diagnosis of hyperandrogenaemia in women is either non-tumoral such as CAH or less common tumoral causes such as adrenal (either pure androgen secreting or Cushing's adenoma/carcinoma) or ovarian tumours. Elevated 17-OHP is the key pointer towards the diagnosis of CAH as was in our cases. However, presence of adrenal mass raised a diagnostic dilemma about reconciling adrenal mass and CAH. Once a diagnosis of CAH is suspected it is important to establish whether it is a classical CAH or non-classical. Lack of cortisol in CAH leads to hypersecretion of ACTH and continued ACTH stimulation due to inadequate or no glucocorticoid therapy may later result in adrenal tumors.

Thus, CAH should be considered in the differential diagnosis of virilization in a young female. Detection of an adrenal mass in such a patient presents a diagnostic dilemma but should not always be thought of as a cortisol producing malignant mass.

### FP-10-6

#### Endocrine Surgeon Pandora Box

Sabaretnam Mayilvaganan, Sarrah Idrees, PRK Bhargav

SGPGIMS

A 14-year-old boy presented with complaints of constant dull aching pain in the right upper abdomen for 1 month associated with multiple episodes of non-bilious vomiting on and off. He also complained of paroxysmal headache, excessive sweating and palpitations. He consulted a local physician and was informed to have high BP 160 over 110 mm Hg with bilateral adrenal masses. He was started on two anti-hypertensive drugs and referred to endocrine surgery OPD.

On examination, BP was 150 over 90 mm Hg in supine position, 130 over 80 mm Hg in standing position. There was no evidence of any neurocutaneous markers and per abdomen examination was unremarkable. His family history was not significant. 24-hour urinary metanephrine and normetanephrine was done and normetanephrine was found to be significantly elevated mcg/day. CECT adrenal protocol done showed avidly enhancing right adrenal lesion, multiple heterogeneously avid enhancing lesions in bilateral paraaortic region starting from below the origin of SMA and up to bifurcation of abdominal aorta along with multiple mesenteric lymph nodes, largest measuring 12 mm in SAD suggestive of right pheochromocytoma and multiple para-aortic paragangliomas. Whole body MIBG scan done revealed tracer avid lesion in right adrenal gland with multiple retroperitoneal lesions lymph node metastasis paraganglioma.

Evaluation for syndromic association revealed no significant abnormalities. VHL sequencing was done which was reported as negative.

After adequate preoperative preparation alpha blockade and discussion, it was decided to proceed with open exploration with right adrenalectomy with excision of all paragangliomas with B/L retroperitoneal lymph node dissection.

The patient tolerated surgery well. Postoperative period was uneventful, and he became normotensive. HPE was reported as right pheochromocytoma with features of adrenal medullary hyperplasia, 12 paragangliomas and reactive hyperplasia of lymph nodes.

Currently, patient is normotensive and under annual follow up with normal catecholamine levels.

### FJ-1-1

#### Do Pheochromocytoma Patients need Postoperative Intensive Care Treatment?

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#### Introduction

Following guidelines, postoperative management after pheochromocytoma resection includes 24 hours of continuous blood pressure monitoring, usually necessitating intensive care unit (ICU) admission. In the present study, we analyze pheochromocytoma patients who had minimally invasive operations at two different institutions with or without preoperative alpha-receptor blockers.

#### Methods

Between December 1994 and August 2021, 559 patients (281M, 278 F, mean age: 48.3 16.5) underwent operations using the retroperitoneoscopic approach. Patients were divided into three cohorts. Group 1 (G1) operated from 1994 to 1999 (n=28), Group 2 (G2) from 2000 to 2009 (n=193), and Group 3 (G3) from 2010 to 2021 (n=338). Intraoperative management included general anesthesia with the introduction of central venous catheters and arterial lines. Postoperatively, patients were sent to the ICU directly or stayed in the recovery room for 1-4 hours with further admission to the normal ward. G1 patients (17 M, 11 F, mean age: 47.8 16.0 years) were operated on at the University Hospital of Essen and received preoperative alpha-receptor blockers. G2 patients (96M, 97 F, mean age: 43.0 16.2 years) and G3 patients (168M, 170F, mean age: 46.8 16.6) were treated at Kliniken Essen-Mitte, G2 patients with preoperative alpha-receptor blockers, and G3 patients without alpha-blockade. We retrospectively analyzed data focusing on the incidence and reasons for postoperative ICU admission. The results are statistically evaluated with significance set at  $p < 0.05$ .

#### Result

In G1 a total of 25 of 28 patients were admitted to intensive care postoperatively (89%). Highly significant reductions ( $p < 0.001$ ) in intensive care requirement could be observed in G2 (18 of 193; 9.3%) and in G3 (6 of 338; 1.8%). The indication for ICU treatment in G1 was routine observation. In G2, 16 patients were admitted to intensive care unit for observation, one patient developed a postoperative brief reactive psychosis, and one had a previous coronary artery disease. In G3, three patients were admitted to the ICU due to pre-existing coronary heart disease, two patients with postoperative hypotension and prolonged catecholamine therapy, and one patient with postoperative bleeding requiring reoperation. None patients were sent to the ICU because of intraoperative acute myocardial infarction or stroke.

#### Conclusion

Postoperative ICU treatment in pheochromocytoma patients depends mainly on institutional practice. Today, observation in ICU can be reduced to a couple of patients. The omission of medical pretreatment does not increase the need for ICU management.

FJ-1-2

**Hungry bone syndrome after parathyroidectomy in renal hyperparathyroidism: A retrospective analysis**

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Background

Parathyroidectomy is the only option for medically refractory renal hyperparathyroidism (rHPT) apart from renal transplantation. Post-operative hungry bone syndrome (HBS) is often described but literature is scarce and inconsistent.

Methods

A retrospective cohort study on consecutive parathyroidectomies for rHPT over three years at a tertiary referral centre was performed.

Results

Fifty-one patients with rHPT on chronic dialysis underwent parathyroidectomy during this period. 88.2% of them received combination of phosphate binders, vitamin D analogues and calcimimetics pre-operatively. All patients received pre-operative calcium and vitamin D loading. 90.2% of patients underwent four glands excision without auto-transplantation. Ten had additional concomitant procedures ranging from partial thyroidectomy to bilateral cervical thymectomy.

All patients demonstrated a drop in serum calcium and phosphate with a concomitant rise in alkaline phosphatase (ALP) post-operation. Twenty-seven (52.9%) patients developed HBS defined as serum adjusted calcium (adj-Ca) <2.1mmol/L for >96 hours after surgery despite standard oral and intravenous calcium replacement. Regardless, the nidus of adj-Ca was observed on post-operative day 3 in both HBS and non-HBS subgroups. The adj-Ca remained lower in HBS subgroup until two weeks post-operation.

HBS was associated with longer duration of intravenous calcium and length of stay. The dosage of maintenance oral calcium and vitamin D analogue was significantly greater in the HBS subgroup until 3 months post operation. 89.3% of the entire cohort achieved normalization of PTH in the immediate postoperative period, and 83.8% remained cured at six months. Cure rates were independent of HBS.

At univariate analysis, significant factors related to the development of HBS included the total weight of parathyroid resected, the preoperative serum PTH, and ALP level; but did not include patients' age, preoperative serum calcium level, preoperative loading calcium or vitamin D, nor the use of calcimimetics. Preoperative ALP level remained an independent predictor of HBS in multivariate regression.

Conclusion

HBS was common after total parathyroidectomy without auto-transplantation. Serum calcium reached nadir at postoperative day 3 regardless of patient having HBS or not. Patients without risk factors for HBS may be discharged early to close monitoring of calcium level as out-patient.

FJ-1-3

**Prophylactic Thyroidectomy in north Indian cohort of MEN2A patients**

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Background: Medullary thyroid cancer in its hereditary form affects approximately one fourth of all cases of MTC. With its Autosomal Dominant inheritance, pathogenic variants in RET proto oncogene located on chromosome 10.q.11.2 leads to a spectrum of neuroectodermal malignancies- both in location and severity. The American Thyroid Association (ATA) in its 2015 guidelines has stratified patients with MEN2 from low- to high-risk groups based on the identified pathogenic variant in RET proto-oncogene and the severity of the associated clinical course of MTC

Aim: To study the clinical features and outcome of patients of North Indian population of MEN 2A undergoing Prophylactic thyroidectomy and to evaluate the extent of surgery.

Methodology: A retrospective study with prospective follow up conducted in a tertiary health care centre in North India. All patients with confirmed diagnosis of MEN 2A who underwent prophylactic total thyroidectomy were included. Any patient who did not undergo genetic testing or had incomplete records were excluded.

Results: 10 patients of 7 MEN 2A families who underwent Prophylactic thyroidectomy were studied. The mean age of the cohort was 14.10 years (3 years-36 years) with a male: female ratio of 3:2. Codon 634 was found in 7 patients (C>Y n=4; C>G n=2; T>C n=1), 631 in 2 patients (D>Y n=2), 611 in 1 patient (G>A n=1).

Discussion: The extent of applicability of ATA RET mutation risk stratification to the Indian population is studied. In a 21-year-old male, with high risk mutation in codon 634 (Cysteine>Glycine) (Serum Calcitonin 32.4pg/ml) showed an unremarkable thyroid parenchyma on final histopathology. In comparison, another 17-year-old male with a moderate risk 611 mutation (Glycine>Arginine) (Serum calcitonin 6.36 pg/ml) showed foci of Medullary thyroid carcinoma on final histopathology. While multiple case reports identify 611(G>A) as a mild mutation, our patient with 611 mutation had a subcentimetric foci of MTC while none of the 7 of the 634 mutation patients were found to have MTC.

6 out of 10 patients underwent lymph node dissection of the central compartment, while 3 patients additionally underwent unilateral Level II, III, IV Lymph node dissections. With only one patient showing foci of MTC in the thyroid parenchyma, none of the Lymph node dissections showed any evidence of metastasis. Taking into consideration that Serum calcitonin for all patients was less than 50 pg/ml, should frozen section biopsy of the central compartment lymph nodes suffice in this cohort of patients.



### FJ-1-4

#### Different gene alteration patterns in benign thyroid goitre and papillary thyroid cancer patients

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**Introduction:** Papillary thyroid cancer (PTC) is the most common thyroid malignancy. Benign thyroid nodules or goitre (BTG) may be concurrently present with the malignant lesions suggesting the possibility of BTG to PTC transformation. This study investigated potential molecular mechanism associated with the transformation of benign to malignant thyroid nodules. Similarities and differences in alteration patterns of tumour-related genes in BTG patients and PTC patients with BTG cytomorphological background were compared and assessed.

**Materials and methods:** Patients admitted to University Malaya Medical Centre (UMMC) for thyroid surgery were categorised according to their histopathology results into: (a) BTG patients (n = 9) and (b) PTC patients with BTG background (PTCwg, n = 5). Whole exome sequencing (WES) analysis was performed using genomic DNA (gDNA) extracted from their thyroid tissue specimen. Nonsynonymous and splice-site single nucleotide variants (SNVs) with minor allele frequency (MAF) <0.01 in 1000 Genome Project were subjected to comparative analysis against OncoKB and COSMIC cancer gene census databases. Protein-protein interaction (PPI) enrichment of the tumour-related genes was analysed using Metascape and MCODE algorithm.

**Results:** Comparative analysis against OncoKB and COSMIC identified 206 tumour-related genes that were affected in the two patient cohorts of which 95 were BTG-specific while 57 were PTCwg-specific. A total of 54 tumour-related genes including *NCOR2* and *PALB2* were mutated in both the BTG and the PTCwg groups. *BRAF*<sup>V600E</sup>, a known activating mutation was absent in the BTG patients but was present in two out of the five PTCwg patients. PPI enrichment analysis of the tumour-related genes highlighted *Pathways in cancer*, *DNA repair* and *Fanconi anaemia pathway* as the top enriched ontology terms in the two groups, where *double-strand break repair* and *Homologous recombination* were enriched at a higher significant level in the PTCwg group. However, signalling pathways involving tyrosine kinase activity regulation, *Jak-STAT signalling pathway* and *Notch signalling pathway* were significantly enriched in PTCwg only.

**Conclusion:** Based on our findings, we hypothesise that molecular alterations associated with DNA damage repair mechanisms, JAK-STAT/Notch and tyrosine kinase signalling pathways may contribute towards BTG to PTC progression.

### FJ-1-5

#### Effect Of Thyroidectomy On Tracheal Remodelling And Consequent Airway Physiology

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**Background:** Upper airway obstruction is frequently (UAO) reported in patients with goitre but is severely underestimated. UAO has been reported in 26-60% of patients undergoing thyroidectomy. Forced spirometry is the simplest method to evaluate UAO and X-ray neck, the safest and simplest method to detect tracheal deviation and change in tracheal diameter.

**Aim:** To study tracheal remodelling using X-ray neck and change in pulmonary function profile using flow volume loop in asymptomatic patient undergoing thyroidectomies.

**Methods:** 50 patient undergoing thyroidectomies from Feb 2019 to Aug 2019 were enrolled in the study. X-ray neck AP and Lateral view and pulmonary function test were performed preoperatively and on postoperative day 10 and 6 weeks.

**Results:** 84.3% (44) of the study population were female, mean duration and weight of goitre were 54.7 months and 72.21gm respectively. Significant increase in tracheal diameter (anteroposterior as well as transverse) was observed at the level of maximum constriction at postoperative day 10 and 6 weeks as compared to preoperative. Significant improvement was observed in FEV1, PEF, FEV1/FEV0.5, FEF50%/FIF50% at postoperative 6 weeks but no difference was observed at postoperative day 10. On Pearson correlation analysis, a positive correlation was found between X-ray and spirometry findings. Patient with left sided tracheal deviation had significantly better preoperative FEV1 and FEV25-75 as compared to patients with right sided deviation.

**Conclusion:** Even though patients maybe asymptomatic at presentation, there can be underlying significant abnormal changes in airway physiology and tracheal dimension which can be analysed by using forced spirometry and X-ray neck.



### FJ-1-6

#### Factors affecting individual decision-making: Quality-of-life study on papillary thyroid carcinoma

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**Introduction:** Active surveillance (AS) for low-risk papillary thyroid carcinoma (PTC) has spread worldwide as a reasonable treatment choice. Our previous cross-sectional study revealed that patients under AS had better psychological health and less anxiety than patients who underwent immediate surgery. The aim of this patient-reported outcome (PRO) study was to investigate factors affecting individual shared decision-making on the treatment choice of low-risk PTC.

**Materials and Methods:** Among 78 patients with low-risk PTC, 53 patients chose AS and 25 chose to undergo immediate surgery; including both conventional surgery (n = 13) and video-assisted neck surgery (n = 12). We conducted PRO surveys at the time of decision making using two instruments; namely, 1) State-Trait Anxiety Inventory (STAI) to evaluate patients' trait and state anxiety, and 2) original questionnaire to elucidate opinions or information influencing the treatment choice and patients' satisfaction with the decision.

**Results:** In the entire cohort, mean age was 51.8 ± 12.8 years and 61 patients (78.2%) were women. Compared to patients who chose AS, patients who chose surgery were younger (p = 0.002) and had larger tumor (p = 0.04). No significant differences were seen in sex, the presence of multiple tumors, family history of thyroid disease, Hashimoto's disease, and history of other malignancies between the two groups. Patients who chose AS had significantly better state and trait anxiety than those who chose surgery (p = 0.0003, p = 0.04). As for decision-making on management strategy, 5 (6.4%) answered that they determined by their own will, 60 (76.9%) decided by themselves based on doctors' advice, 11 (14.1%) made up their mind together with doctors, and 2 (2.6%) replied that decision was made by doctors after consultation. Compared to those who chose AS, patients who chose surgery tended to make their decision by their own will (p = 0.01). While patients who chose AS felt that they were fully informed about their medical condition in comparison to those who chose surgery (p = 0.007). No significant differences were seen in satisfaction with treatment choices between groups.

**Conclusion:** Patients who chose AS had less anxiety and felt more informed about the disease than those who chose immediate surgery. However, patients who chose surgery tended to feel more autonomous in their decision. Considering patients' personalities and intentions is needed for patient-centered shared decision-making.

### FJ-2-1

#### Factors of persistent hypercalcemia with tertiary hyperparathyroidism after parathyroidectomy

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**Purpose:** Surgical management is treatment of choice for tertiary hyperparathyroidism. The aim of this study was to analyze which factors were attribute to persistent hypercalcemia and to evaluate the surgical extent in tertiary hyperparathyroidism (THPT) after kidney transplantation.

**Method:** We retrospectively analyzed 100 cases for THPT after kidney transplantation between June 2011 and February 2022 at Asan Medical Center. Patients were divided into two groups: 22 patients with persistent hypercalcemia after parathyroidectomy and 78 patients with normocalcemia after parathyroidectomy. Persistent hypercalcemia was defined as sustained hypercalcemia (>10.3mg/dL) 6 months after the surgical management. We compared biochemical and clinicopathological features between the two groups. Multivariable logistic regression analysis method was used to evaluate possible risk factors associated with persistent hypercalcemia.

**Results:** The incidence of patients with serum intact PTH level more than 65 pg/mL was significantly higher in hypercalcemia group (40.9% vs. 7.7%). The proportion of patients who underwent less than subtotal thyroidectomy and patient with bigger remnant size of preserved parathyroid gland (>0.8cm) were also significantly higher in persistent hypercalcemia group (19.2% vs. 50%), (29.7% vs. 52.6%). There was no significant difference in the preoperative serum calcium, intact PTH, phosphorus and the duration of hemodialysis. In multivariate logistic regression analysis, the drop rate of intact PTH less than 88% at POD1 [OR 10.3, 95% CI(2.7~39.1), p=0.001], the resected parathyroid gland less than two [OR 6.8, 95% CI(1.8~26.7), p=0.001] were determined as risk factor associated with persistent hypercalcemia.

**Conclusion:** The drop rate of intact PTH less than 88% at POD1 was independently associated with persistent hypercalcemia with the extent of surgery enough to control the autonomic function by resecting the appropriate parathyroid volume. The confirmation of parathyroid lesion through frozen biopsy or intraoperative PTH monitoring might be helpful to prevent the missing parathyroid gland and to accomplish normocalcemia after parathyroidectomy.

**Key words:** hyperparathyroidism, Tertiary; parathyroidectomy; kidney transplantation

**FJ-2-2****Utility of Nuclear Magnetic Resonance Spectroscopy Metabolomics for Diseases of Adrenal Gland**

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**Introduction and background:** The prevalence of adrenal incidentaloma increases with age and their management is governed by the size of the tumor at presentation, the rate of growth, imaging characteristics and biochemical findings. To differentiate between benign adrenal incidentalomas and malignant ones, patient generally has to undergo adrenalectomy. For diagnosis of pheochromocytoma, 24 hrs urinary metanephrines and nor metanephrines are used but they have a sensitivity of around 70 percent only, while plasma metanephrines, though have a sensitivity of 99 percent, have a negative predictive value of only 38 percent in patients who have a low risk for pheochromocytoma. So, adrenal metabolite profiling may help in detection of subtle changes in steroid production by adrenal lesions and help in their evaluation as well as differentiation.

**Aim:** To study and compare the metabolomic patterns in various pathologies of the Adrenal Gland

**Material and methods:** This was a prospective analytical study of patients presenting with adrenal lesions at department of endocrine surgery, SGPGIMS, Lucknow between Jan 2019 to Feb 2020. Spot serum and urinary samples were collected from the patients and OPLS DA was performed to study the distinction between the study groups. Various univariate and multivariate metabolomic analysis were performed to identify the significant metabolites leading to the distinction between the study groups. The cut of criteria used for metabolites to be identified as a potential biomarkers was p value less than 0.05 FDR less than 0.05.

**Results:** 43 patients were included in the study: 10 non-functional adenomas, 2 cysts, 3 Conn's adenomas, 2 Cushing's adenomas, 15 Pheochromocytomas, 11 adrenocortical carcinomas. The mean age was 40.3 years (range 18 to 78), gender ratio almost same. Ten healthy controls were also taken with mean age 33.5 years (range 28 to 45). The adenomas were clubbed under one group and compared with adrenocortical carcinoma and pheochromocytoma while adrenocortical carcinoma was also compared with pheochromocytoma and the control group. Significant metabolites in both urine and serum among the groups were quantified and the common metabolites were also noted.

**Conclusion:** Nuclear magnetic resonance spectroscopy metabolomics could be used as an adjunct for diagnosis of diseases of adrenal gland and help in differentiating adrenocortical carcinoma from other lesions.

**FJ-2-3****Clinicopathologic and genetic characteristics of patients of different ages with DSVPTC**

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**Aim:** To describe the clinicopathological and genetic characteristics of patients of different ages with diffuse sclerosing variant of papillary thyroid carcinoma (DSVPTC).

**Material and Methods:** We retrospectively reviewed 397 patients who underwent thyroidectomy for DSVPTC at the Gangnam Severance Hospital, Yonsei University from January 2005 to December 2017. We selected 41 patients through random sampling by their age group, and examined mutations in 119 genes using next-generation sequencing.

**Results:** The mean age at diagnosis was 36.7±11.6 years, with the majority of patients (163, 41.1%) in their third decades. DSVPTC was predominant in women (276, 69.5%), compared with men. We observed recurrence in 46 patients (11.6%), with regional nodal recurrence being the most common recurrence site (32 patients, 69.6%). The tumour size increased in younger patients (<20 years: 2.69 ±1.56, 21-30 years: 1.88±1.30, and 31-40 years: 1.55±0.95), those displaying a plateau in their fourths (1.38±0.85) and fifth (1.29±0.91) decades, and those above 61 years of age (1.63±1.45). The initial presentation of cancer was more aggressive in pediatric patients with a larger size, more common multiplicity, and lateral neck metastasis. BRAF, KRAS and TERT displayed relatively higher mutations, compared with other genes.

**Conclusion:** DSVPTC displayed different clinical, pathological, and molecular profiles, compared with papillary thyroid carcinoma. BRAF, KRAS and TERT were the most important genetic mutations, with differences depending on the age.

FJ-2-4

**Single-Port Transaxillary Robotic Bilateral Total Thyroidectomy (START) for Graves' Disease: Initial experience Using da Vinci SP Robotic System**

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Purpose

Graves' disease (GD) is an autoimmune disorder and the most common cause of persistent hyperthyroidism. Recently, robotic transaxillary thyroidectomy has served as a minimally invasive surgical alternative to conventional open thyroidectomy, even for patients with GD. In 2019, we first performed single-port transaxillary bilateral total thyroidectomy using the da Vinci SP robotic system (START). This study aimed to evaluate the technical feasibility of START for GD.

Methods

This retrospective review included 18 patients with GD who underwent START at our institution between September 2020 and September 2022 by a single surgeon.

Results

All 18 patients were female, and the body-mass index was 22.2±3.4 kg/m<sup>2</sup> (range, 18.2–29.0). Eleven patients (61.1%) had thyroid carcinoma, four (22.2%) had persistent hyperthyroidism despite medical control, and three patients (16.7%) had Graves' ophthalmopathy. The mean operation time was 169.2±22.8 min (range, 128–226), and the mean estimated blood loss was 65.6±141.4 mL (range, 10–600). There were no cases of conversion to open surgery. There were no intraoperative complications and nine cases of postoperative complications, including transient hypocalcemia in six cases, bleeding with reoperation in two cases, and transient hoarseness in one case.

Conclusions

Patients with GD with large goiter and hypervascularity require delicate ligation, even of minor vessels, in a narrow space. START is feasible and safe for GD performed by high-volume expert surgeons.

FJ-2-5

**High Intensity Focused Ultrasound for Benign Thyroid Nodules - A 1-year Prospective Study**

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Background: High Intensity Focused Ultrasound (HIFU) is an emerging thermoablative treatment for symptomatic benign thyroid nodules. This study aims to evaluate its efficacy and safety in treating benign thyroid nodule.

Method: This is a prospective observational study on consecutive patients with symptomatic benign thyroid nodules undergoing HIFU between May and December 2019. Patients having nodules with size ≤4cm, sonographic solidity ≥70% and ≥3mm away from vital structures were included. Those with indeterminate or malignant features on cytology or ultrasound, previous neck irradiation, pre-existing vocal cord palsy were excluded. HIFU device Echopulse® was used. Primary outcome was volume reduction rate (VRR) at 1, 3, 6, and 12 months. Secondary outcomes included thyroid function, procedure-related complications, post-procedure pain and patient satisfaction.

Results: Thirty-one cytology-proven benign nodules of 25 patients (24 females and 1 male) with median age of 55 (37.5-59) years were included. The median baseline estimated nodule volume was 10.1mL (6.9-17.5mL) and the median solid percentage was 86% (75-95%). HIFU treatment resulted in median VRR of 21.5% (-15.6-34.0%), 28.4% (14.2-63%), 56.5% (16.6-70.7%) and 63.9% (28.5-75.8%) at 1, 3, 6 and 12 months respectively. At 12 months, the median volume of nodule reduced significantly to 4.39mL (1.7-12.6mL) (p=0.001) and 54.8% (n=17) of nodules could achieve ≥50% volume reduction. Following HIFU, the pain score (0-100) reduced from median of 50 (40-70) on day 0 to 10 (5-25) on day 7. The median patient satisfaction score (0-100) was 80 at 12 months. Peri-procedural morbidity rate was 6.4% (n=2). One patient (3.2%) experienced transient recurrent laryngeal nerve palsy and one patient (3.2%) developed transient Horner's syndrome. Both patients completely recovered within 3 months. There was no post-procedural readmission or mortality. Three patients underwent thyroidectomy at 1 year due to persistent symptoms (VRR range -63.4% to 32.8%). Among which, one patient had incidental minimally invasive follicular thyroid carcinoma in final histopathology.

Conclusion: HIFU was a safe and effective non-surgical treatment in achieving thyroid nodule volume reduction of over 60% by 1 year. Larger scale studies and longer follow-up are needed to verify its long-term efficacy and durability.

**FJ-2-6****Effects of Neoadjuvant Chemoradiotherapy on unresectable anaplastic thyroid carcinoma: a single center experience**

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**Keywords:** Anaplastic thyroid cancer, Neoadjuvant therapy, Concurrent chemoradiotherapy

**Background :** Anaplastic thyroid cancer (ATC) is associated with the highest mortality risk of any thyroid-arising tumor, but there has been no effective therapy, although a multimodal therapy results in a relatively. The current study investigated the effects of neoadjuvant chemoradiotherapy on unresectable ATC patient with paclitaxel.

**Methods:** The medical records of 152 patients with ATC at Gangnam Severance Hospital were reviewed between January 2016 and March 2022. Only eight patients were eligible for surgery after neoadjuvant chemoradiotherapy by a Gangnam Severance Hospital protocol for ATC.

**Results:** Six patients were female, and two patients were male. The median age of the patients was 59 years (range: 53-76 years). The median tumor size of the patients was 4.15 cm (range: 2.1-5.6 cm). Regional lymph node metastasis exhibited five patients and distant metastasis exhibited three patients. All patients were consented as unresectable cases and treated by neoadjuvant paclitaxel with concomitant intensity-modulated radiation therapy (IMRT). The median cycles of neoadjuvant paclitaxel were 5 cycles (range 2-6 cycles) and the median dose of IMRT was 5680 cGy (range 5250-6600 cGy). Adjuvant paclitaxel therapy was performed in three patients and 2nd line targeted therapy using lenvatinib was performed in four patients. Tumor size decreased in four patients after neoadjuvant chemoradiotherapy. Three patients showed no differences or increases in tumor size after neoadjuvant chemoradiotherapy, but eminent tumor necrosis by neoadjuvant therapy was exhibited. Of the five patients with initial nodal metastasis, four patients showed a decrease in metastatic node size with internal tumor necrosis. The median interval from neoadjuvant radiation therapy to surgery was 99.5 days (range 14-170). Of the eight patients, five died related to the disease. The median survival of all ATC patients with neoadjuvant chemoradiotherapy was 445 days (range 123-2,023)

**Conclusion:** Unresectable anaplastic thyroid cancer had possibility that be turned into resectable case after eligible neoadjuvant chemoradiotherapy. It helps clinicians positively consider neoadjuvant chemoradiotherapy as a treatment option for patients with unresectable ATC.

**FJ-3-1****Atypical Parathyroid Adenoma: clearing up the "grey area" between Parathyroid Adenoma and Carcinoma**

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**Background:** After parathyroidectomy, parathyroid tumor pathology reports are given as parathyroid adenoma (PA), atypical parathyroid adenoma (APA), and parathyroid carcinoma (PC). APA is regarded as an intermediate form, not yet fully understood and falls in the "grey area" between benign disease and malignancy. The aim of this study is to investigate clinical and biochemical differences in PA, APA, and PC and the outcomes of post parathyroidectomy so that patients diagnosed with APA can be properly managed.

**Method:** This single center study collected data retrospectively from primary hyperparathyroidism (PHPT) patients who underwent parathyroidectomy from June 2003 to August 2021.

**Results:** 229 patients were diagnosed with PHPT and classified as PA (n=175, 76.4%), APA (n=23, 10.0%), and PC (n=12, 5.2%). Sex ratio, age at diagnosis, and BMI were not significantly different in all groups. Clinical manifestations such as renal involvement and bone involvement were also compared between the groups. The mean preoperative PTH levels were 189.2 pg/mL, 219.6 pg/mL, 406.6 pg/mL in PA, APA, PC groups respectively. The mean preoperative serum calcium levels were 11.3 mg/dL, 11.8 mg/dL, 12.3 mg/dL in each group. Three months after initial surgery mean PTH levels were 37.1 pg/mL for PA, 32.4 pg/mL for APA, 31.8 pg/mL for PC group. Three months postoperative mean calcium levels were 9.5 mg/dL, 9.7 mg/dL, 9.6 mg/dL.

**Conclusion:** Corresponding to previous studies, all our patients diagnosed with APA had good prognosis suggesting clinical course of APA comply with PA. During the follow up period, there was no disease relapse in 23 patients diagnosed with APA; and 4 patients out of 175 PA patients had disease recurrence. Interestingly, none of the patients from PC group had disease recurrence.



FJ-3-2

**Intraoperative laser spectroscopy of autofluorescence of the parathyroid glands in thyroid surgery**

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Background

The paper presents the results of testing "in vivo" laser-fluorescent complex for the identification of parathyroid glands during operations on the thyroid gland in order to prevent hypoparathyroidism.

Materials

To measure the autofluorescence spectra from the parathyroid glands and surrounding tissues, an instrumental complex was created consisting of: a continuous excitation laser with a wavelength of 785 nm and a power of 100 mW (Sacher), a Y-shaped fiber optic probe with separate optical channels for emitting the excitation laser and collecting autofluorescence light (Thorlabs), nodes for input and output of optical radiation into the optical probe (Thorlabs, Standa), spectral filter with a cutoff wavelength of 800 nm to suppress scattered laser radiation (Thorlabs), spectrometer with a Peltier-cooled CCD photodetector with a spectral width of the simultaneously recorded spectrum about 60 nm. The complex was controlled and autofluorescence spectra were recorded using a personal computer and original software; numerical data processing was carried out using the Origin software package.

Results

For the cases when the surgeon confidently determined the region of the spectra acquisition as the parathyroid or thyroid gland, the ratio of the parathyroid gland autofluorescence signal to the thyroid gland signal for five patients turned out to be in the range of 1.5–7.3.

Conclusion

The near infrared autofluorescence method makes it possible to reliably identify the parathyroid glands during operations on the thyroid gland.

FJ-3-3

**Survival after hemithyroidectomy and total thyroidectomy in differentiated thyroid cancer**

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Background

The extent of thyroid surgery remains controversial for differentiated thyroid cancers (DTC) that measure > 1cm but are not considered high-risk. This study aimed to compare survival outcomes between hemithyroidectomy (HT) and total thyroidectomy (TT) in non-high-risk DTC.

Methods

A population-based retrospective cohort of patients with non-high-risk DTC > 1cm undergoing HT or TT between 1997 and 2017 in a territory with 41 public hospitals and clinics serving a population of seven million was analyzed. Multivariable Cox proportional hazards regression models adjusted for patient demographics and clinical parameters were used to compare the overall, disease-specific, and recurrence-free survival between TT and HT. Risks of postoperative complications were compared between the two groups.

Results

A total of 4,771 patients (HT: 1,368; TT: 3,403) underwent thyroid surgery as primary treatment. Median (range) follow-up was 117 (range: 72 -179) months. Patients in TT and HT group had comparable risks of overall survival (HR = 0.87; 95% CI = 0.73 - 1.04; P = 0.119) and disease-specific survival (HR = 0.85; 95% CI = 0.52 -1.40; P = 0.518). TT group had a better recurrence-free survival (HR = 0.37; 95% CI = 0.26 - 0.52; P < 0.001) than the HT group. The temporary and permanent hypoparathyroidism rates in TT group were 14.96% and 7.49%, respectively; none were reported in the HT group.

Conclusions:

Despite the comparable overall and disease-specific survivals, TT was associated with better recurrence-free survival than HT in a 10-year follow-up. This was at the expense of higher surgical morbidity in TT.

**FJ-3-4****Identifying ATP-binding cassette (ABC) transporters in Papillary Thyroid Cancer**

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**Introduction :** Well-differentiated thyroid cancers i.e. papillary (PTC) and follicular types are generally associated with excellent prognosis. However, there are subgroups of patients that suffer from local recurrence (20%), distant metastasis (10%) and non-avid tumours (20%) that frequently resulted in cancer mortality. Identification of these patients is important to personalize treatment options. The role of ATP-binding cassette (ABC)-transporters in PTC has not been explored. Results of this study will perhaps allow us to suggest improvement in the current standard management of non-radioiodine avid and LN-positive PTC in the future. The aim of this study is to identify novel ABC-transporter in LN-positive PTC.

**Patients and Methods :** Tissue samples from LN-positive and LN-negative PTC were obtained from the UKM Molecular Biology Institute (UMBI). Samples were cryosectioned and H&E stained. RNA was extracted from samples that showed more than 80% tumour within the slide prep. mRNA profiling of PTC samples were performed on a Agilent One-colour SurePrint G3 Human Gene Expression V3 Microarray, 8x60K (Agilent Technologies, Santa Clara, CA, USA). Raw data were acquired and input into AltAnalyze software. Differentially expressed genes (DEGs) were screened out under the criterion of absolute fold change (FC) less and equal to -2 or more and equal to 2 and  $p < 0.05$  (moderated t-test).

**Results :** Three samples from each group underwent microarray gene analysis. There was a clear separation of genes expressed between LN-positive and LN-negative tumours. The ATP-binding cassette sub-family A (ABC1), member 2 or known as ABCA2 is expressed in a significantly higher number in the LN-positive samples ( $p < 0.05$ ).

**Conclusion :** The higher expression of the ABCA2 gene in LN-positive PTC may enable researchers to exploit its function following further characterisation of its role in disease progression and aggressive behaviour. Furthermore, with this novel finding, extrapolation can be made on the more difficult to manage non-radioiodine avid PTC.

**Key Words :** ATP binding cassettes, papillary thyroid cancer, lymph node.

**FJ-3-5****First postoperative day parathyroid hormone in predicting post total thyroidectomy hypocalcemia**

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**Introduction**

Hypocalcemia (HC) is the most common complication after total thyroidectomy (TT). Measurement of serum parathyroid hormone (PTH) has been demonstrated to be useful in predicting HC in the postoperative period. However, there has not been a consensus on the most appropriate timing of PTH measurement or threshold of PTH that would optimally guide the management of postoperative HC. We routinely monitor patients for five days for development of post-TT hypocalcemia. While biochemical hypocalcemia is an innocuous condition, development of clinically significant hypocalcemia (sign and/or symptoms of hypocalcemia) is a potentially life-threatening condition. This study aimed at evaluating the accuracy of PTH measured on the early morning of first postoperative day (POD-1) and knowing the cut-off value of PTH that can predict clinically significant hypocalcemia (CSH).

**Material and Methods**

This is a retrospectively review of prospectively maintained data. All patients undergoing total thyroidectomy for benign/malignant diseases of thyroid between Feb. 2018 to Jan. 2022 were included. Those patients who were started on calcium supplementation on POD-0 or discharged before POD-5 were excluded from the study. Serum calcium, PTH, and albumin were measured on POD-1 while from POD-2 onwards only serum calcium was measured. Those patients who developed preclinical hypocalcemia/ clinical hypocalcemia were treated with oral and/or intravenous calcium, and calcitriol supplementation. They were discharged once they became asymptomatic, and biochemically eucalcemic. To determine the diagnostic accuracy of PTH, ROC curve analysis was performed, and AUC was calculated. The cutoff value of PTH providing the highest sensitivity and specificity was also calculated from the ROC curve.

**Results**

91 patients (F:M= 5.7:1), with a mean age of 39.1±14.5 years were included. 52 (57.1%) patients had benign disease, while 39(42.1%) had malignant disease. 19(20.9%) patients underwent central compartment dissection in addition to TT. 28(30.8%) patients developed CSH. The area under curve was 0.88 (95% CI: 0.79-0.96,  $p < 0.001$ ). Serum PTH value  $< 27.2$  pg/ml had a sensitivity of 96.4% and a specificity of 65.1% in predicting development of CSH.

**Conclusion**

In our study serum PTH value of  $< 27.2$  pg/ml measured on the early morning of first postoperative day following TT was found to have good accuracy for predicting development of clinically significant hypocalcemia within the next 5 days.

**FJ-3-6****VOICE OUTCOMES POST THYROIDECTOMY WITH SUPRAGLOTTIC AIRWAY DEVICE VS ENDOTRACHEAL TUBE - RCT**

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**Introduction:** Thyroidectomy is the most common endocrine surgical procedure and is usually done under general anaesthesia. Endotracheal tube (ETT) is the preferred device for airway control, however supraglottic airway devices (SGA) can be used for thyroidectomy as it may avoid vocal cord oedema and trauma to the laryngopharyngeal apparatus resulting in better patient outcomes. **AIM:** To compare subjective and objective voice outcomes in patients undergoing thyroidectomies with SGA and ETT in the immediate post operative period. **Method:** This single-blinded, randomised controlled trial on 69 patients with goiter was conducted after ethical committee clearance. Patients anticipated to have difficult intubation or poor airway control in view of distorted neck anatomy were excluded. Intra-operative parameters including mean anaesthesia time, duration of surgery and difficulty of surgery based on Thyroid difficulty score (TDS) were noted. Voice analysis using voice handicap index questionnaire (VHI-10) was done in pre-operative period and 1 week post-surgery. Laryngo-pharyngeal symptom scores and sore throat score based on VAS were done on day 1 and day 7 of surgery. **Results:** Thirty five patients were in ETT group and 34 patients were in SGA group. Fifteen patients in the SGA group were converted to ETT in view of repeated failed attempts and air leaks before the start of surgery. Fifty patients in ETT and 19 in SGA were analysed. Thirty five total thyroidectomies and thirty four hemithyroidectomies were performed. Mean age of patients were 35.18 years and 36.58 years respectively. Mean duration of surgery and TDS were similar in both the groups. Although the subjective voice assessment of mean fundamental frequency, jitter, shimmer and mean phonation showed significant improvement in the immediate post operative period in SGA group compared to the ETT group, only mean fundamental frequency showed a statistically significant improvement. Quality of voice (Breathy/harsh/hoarse) had no statistically significant difference in both the groups. Laryngopharyngeal symptoms and VHI were also better in the SGA group at day 1 and day 7. **Conclusion:** Subjective and objective voice outcomes in the immediate post operative period are better in patients undergoing thyroidectomies with a supraglottic airway device with comparable difficulty and duration of surgery.

**FJ-3-7****The treatment of synchronous and metachronous lateral neck metastasis of papillary thyroid cancer**

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**Background:** Recently, as the incidence of thyroid cancer increases, the extent of surgical treatment has been minimized as much as possible. However, recurrence still occurs even after thyroidectomy, and outcomes of patients who underwent lateral neck dissection (LND) due to lateral lymph node metastasis after thyroid surgery are unclear. To compare patients who underwent metachronous lateral neck dissection (mLND) versus synchronous lateral neck dissection (sLND) for papillary thyroid cancer (PTC) and risk factor analysis for mLND. **Methods:** The study included 1613 patients who underwent thyroidectomy and sLND at the Gangnam Severance Hospital, Korea, during the period under review. In 147 patients, only thyroidectomy was performed at the time of diagnosis, and mLND was performed when recurrence to the lateral neck lymph node was confirmed.

**Results:** During a median follow-up of 102.1 months, 110 (6.3%) patients had a recurrence. There was no significant difference in recurrence between the sLND and mLND groups (6.1%, 8.2%,  $p=0.317$ ). The period from LND to recurrence was longer in the mLND group than in the sLND group (113.6 $\pm$ 39.4 months, 87.0 $\pm$ 33.8 months, respectively,  $p<0.001$ ). The median follow-up period was longer in the mLND group than in the sLND group (130.5 months, 97.8 months,  $p<0.001$ ). The age ( $\geq 50$  years) (adjusted HR=5.209, 95% CI=1.359–19.964;  $P=0.016$ ), the tumor factors of tumor size ( $>1.45$  cm) (adjusted HR=4.022, 95% CI=1.036–15.611;  $P=0.044$ ), and the LN ratio in the lateral compartment (adjusted HR=4.043, 95% CI=1.079–15.148;  $P=0.038$ ) were independent variables predictive of recurrence.

**Conclusions and Relevance:** mLND is suitable for treating papillary thyroid cancer in a certain population of patients. Age ( $\geq 50$  years), tumor size ( $> 1.45$  cm), and lateral LNR ( $> 0.17$ ) were strong predictors of RFS in the mLND group, suggesting the importance of careful post-treatment monitoring of patients with these risk factors.