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Voice analysis of patients for assessment of vocal cord function following endoscopic thyroidectomy

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Introduction

Endoscopic thyroidectomy

- Safe and feasible procedure, better cosmetic outcome, comparable oncological outcomes **Concerns ??**
- Nerve injury and postoperative voice changes Often underreported ?

AIM: To assess the vocal cord function using laryngeal examination and voice analysis: TOETVA & BABA

Inclusion criteria

- Age ≥ 18 years
- Benign or cytologically indeterminate lesions involving single lobe of size ≤ 5cm or 40ml

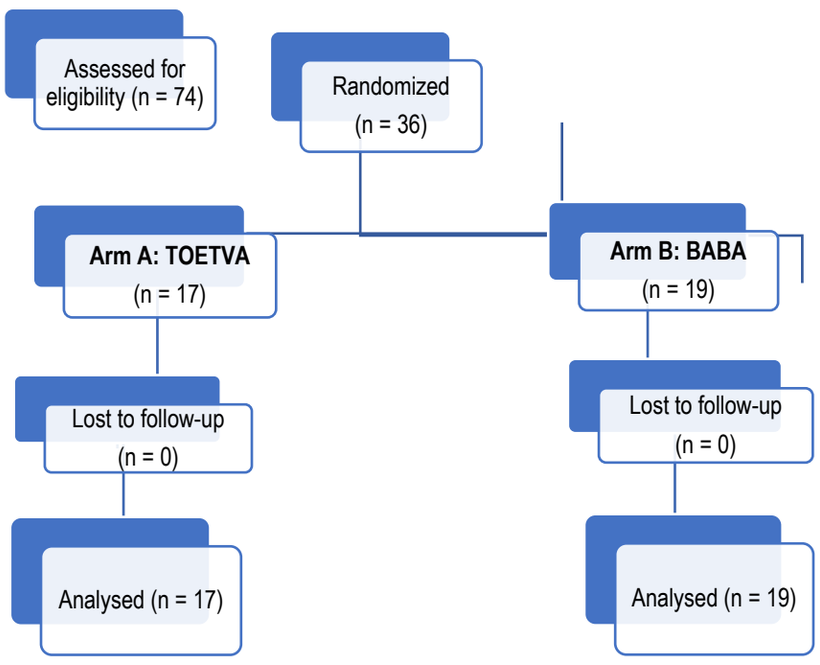
Exclusion criteria

- H/o head and neck surgery/ previous irradiation
- All thyroid lesions of size > 5 cm or 40ml
- All malignant lesions of thyroid
- Substernal thyroidal extension of swelling

Study Design

A single centre, 2 arm, parallel design, open label randomized controlled trial with superiority hypothesis

CONSORT Flow Diagram



Methodology

1. Detailed history with general physical and systemic examination; baseline investigations including TFT
2. Indirect Laryngoscopy – baseline, POD 0 (extubation) & POD 10
3. High Resolution USG neck (TIRADS staging)
4. USG guided FNAC of neck swelling
5. Voice analysis to detect dysphonia (baseline, POD 10 & POD 90):
   a) Subjective evaluation
   b) Acoustic analysis

Voice analysis

A. Subjective evaluation of voice by GRBAS scale by assessing

- Grade of Dysphonia, Roughness, Breathiness, Asthenia and Strain
- Scale 0 - Normal
- Scale 1 - Mild dysphonia
- Scale 2 - Moderate dysphonia
- Scale 3 - Severe dysphonia

B. Acoustic analysis:

- Jitter (N – 0.633 ± 0.351)
- Shimmer (N – 1.997 ± 0.791)
- Harmonic/Noise ratio (N – 0.112 ± 0.009)
- Fundamental frequency (N – 120 to 300 Hz)
- S/Z ratio (N < 1.4)
- Maximum phonatory time (N – 6.6 to 69.5 secs)
- Software

Multidimensional Voice Program (MDVP); CSL PETAX*

Results

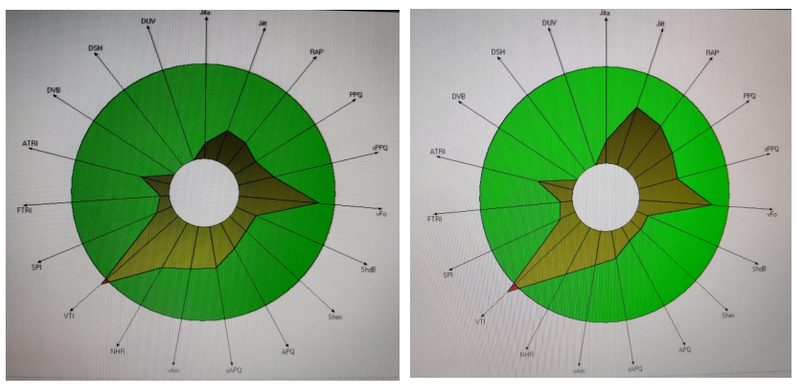
Comparison of subjective evaluation of voice by GRBAS Scale

GRBAS	TOETVA (n = 17) Median (range)	BABA (n = 19) Median (range)	p value	Total (n = 36) Median (range) (p value)
Preop	0 (0 – 7)	0 (0 – 5)	0.91	0 (0 – 7)
POD 10	0 (0 – 10)	0 (0 – 6)	0.56	0 (0 – 10) (p = 0.67, Preop – POD 10)
POD 90	0 (0 – 9)	0 (0 – 5)	0.65	0 (0 – 9) (p = 0.70, Preop – POD 90)

Comparison of objective voice parameters

Parameter	TOETVA (n = 17) Mean ± SD Median (range)	BABA (n = 19) Mean ± SD Median (range)	p value	Total (n = 36) Mean ± SD Median (range) (p value)
F_0 (Hz)				
Preop	254.8 ± 46.8	246.3 ± 28.8	0.51	250.2 ± 47.4
POD 10	256.8 ± 42.9	248.6 ± 44.2	0.57	252.3 ± 43.2 (p = 0.84, Preop – POD 10)
POD 90	258.3 ± 41.5	256 ± 44.5	0.87	257.1 ± 42.5 (p = 0.51, Preop – POD 90)
Jitter (%)				
Preop	0.66 ± 0.26	0.59 ± 0.11	0.29	0.62 ± 0.19
POD 10	0.62 ± 0.30	0.57 ± 0.10	0.49	0.59 ± 0.22 (p = 0.56, Preop – POD 10)
POD 90	0.64 ± 0.29	0.60 ± 0.11	0.58	0.62 ± 0.21 (p = 0.99, Preop – POD 90)
Shimmer (%)*				
Preop	0.85 (0.49 – 2.11)	0.79 (0.59 – 2.71)	0.48	0.80 (0.49 – 2.71)
POD 10	0.87 (0.49 – 3.73)	0.72 (0.60 – 3.14)	0.50	0.80 (0.49 – 3.73) (p = 0.90, Preop – POD 10)
POD 90	0.84 (0.50 – 2.34)	0.78 (0.64 – 2.77)	0.55	0.79 (0.50 – 2.77) (p = 0.87, Preop – POD 90)

Parameter	TOETVA (n = 17) Mean ± SD Median (range)	BABA (n = 19) Mean ± SD Median (range)	p value	Total (n = 36) Mean ± SD Median (range) (p value)
NHR (dB)				
Preop	0.120 ± 0.01	0.127 ± 0.01	0.98	0.123 ± 0.01
POD 10	0.116 ± 0.01	0.121 ± 0.01	0.93	0.118 ± 0.01 (p = 0.03, Preop – POD 10)
POD 90	0.120 ± 0.01	0.126 ± 0.01	0.94	0.124 ± 0.01 (p = 0.67, Preop – POD 90)
MPT (s)				
Preop	14.1 ± 1.2	14 ± 1.0	0.78	14 ± 1.1
POD 10	13.6 ± 1.2	13.3 ± 1.2	0.45	13.4 ± 1.2 (p = 0.03, Preop – POD 10)
POD 90	14.2 ± 1.0	14.1 ± 1.2	0.78	14.2 ± 1.1 (p = 0.44, Preop – POD 90)



Pre-op 12 weeks post-op

Patients with preop. hoarseness

Four patients (2 in each group) - hoarseness of voice

- Relatively low mean frequency and MPT
- High GRBAS scores, jitter %, shimmer % and NHR compared to the rest of the cohort

Trans-Oral Endoscopic Thyroidectomy, Vestibular Approach (TOET-VA)

Bilateral Axillary Breast Approach (BABA)

Conclusions

- Endoscopic thyroidectomy is safe and effective
- Perioperative objective assessment of voice parameters + laryngeal examination routinely performed in pts undergoing endoscopic thyroidectomy provide vital information to the surgeon that may affect the treatment plan, helps in early recognition and management of nerve injury
- Both the techniques were comparable with respect to peri-operative voice changes on subjective and objective (software based) voice analysis