

## Functional Assessment Of Voice Outcome After Thyroid

### Surgeries: Change In DSI Versus VHI In Post-Operative Period

Hossam El-Dessouky (1), Hossam Abdelghaffar (2), Ayatallah Sheikany (3) and

Marwa Rabie (4).

(1) Professor of Phoniatics, Faculty of medicine, Cairo University.

(2) Professor of Audiology, Faculty of medicine, Fayoum University.

(3) Assistant Professor of Phoniatics, Faculty of medicine, Cairo University.

(4) Demonstrator of Phoniatics, Faculty of medicine, Fayoum University.

**Corresponding author : prof.Dr. Hossam El-Dessouky**

**E-Mail address : [abdelmuktader2006@yahoo.com](mailto:abdelmuktader2006@yahoo.com)**

**Tel : 01222148645**

#### ABSTRACT

**Summary: Objective.** Voice changes related to the thyroid is either due to thyroid diseases or following thyroid surgery. Vocal changes are frequent following thyroid surgery. This study evaluate the voice outcome after various thyroid surgeries.

**Subjects and methods.** This prospective non randomized uncontrolled study included 50 patients who attended the ENT and General Surgery outpatient clinics in Fayoum University hospital. The subjects underwent total and partial thyroidectomy. All patients were subjected both Pre as well as Post operatively

(2weeks) to laryngoscopic examination , voice handicap index(VHI) and dysphonia severity index (DSI).

**Results.** There was a highly significant decrease in total DSI and highly significant increase of VHI after the operation. There was a highly significant negative correlation between the DSI and the VHI after operation as general and also among each type of thyroidectomy (hemi and total thyroidectomy). Vocal fold paralysis (VFP) was diagnosed in 9patients in early post-operative assessment ( 6 bilateral paralysis ) and (3 unilateral paralysis).

**Conclusions.** the quality of voice deteriorated after thyroid operation, both subjectively and objectively, even in

absence of VFP, this deterioration is more significant in total thyroidectomy patients. Pre- and immediate postoperative laryngoscopic examination are useful for all patients.

**KEY WORDS:** Voice–  
Thyroidectomy– paralysis -VHI–DSI-  
laryngoscope

## INTRODUCTION

**Thyroidectomy** is an operation that involves the surgical removal of all or part of the thyroid gland. Surgeons often perform a thyroidectomy when a patient has large goiter with compressive manifestation (dyspnea or dysphagia) or thyroid cancer or hyperthyroidism[1].

Voice changes related to thyroid is either due to thyroid diseases or following thyroid surgery. Thyroid diseases occur in the form of abnormalities in the size and shape of the thyroid gland (goiter) and of abnormalities of thyroid secretion (hyper and hypothyroidism). Diffuse or nodular enlargement, whether benign or malignant, may cause compression or invasion of the adjacent recurrent laryngeal nerve (RLN). The patient whose RLN is compromised by pressure or tumor infiltration will have the voice of a paralyzed vocal fold, which will be breathy and barely audible[2].

Thyroid surgery may result in RLN as well as in superior laryngeal nerve (SLN) trauma. RLN injury varies from 1.8% to 13.3% and the external branch of SLN injury varies from 5% to 28%. However, other alterations in voice quality can be found even in the cases with preserved function of laryngeal nerves[3]. In such cases, voice alteration after thyroidectomy could be secondary to laryngeal edema, vocal fold bowing, orotracheal intubation trauma, extralaryngeal strap muscles damage or temporary malfunction of these muscles, and laryngotracheal fixation[4]. The most usual complaints are roughness, volume alteration, and vocal fatigue, which may have an important impact on the patient's professional and social life[3].

## PATIENTS AND METHODS

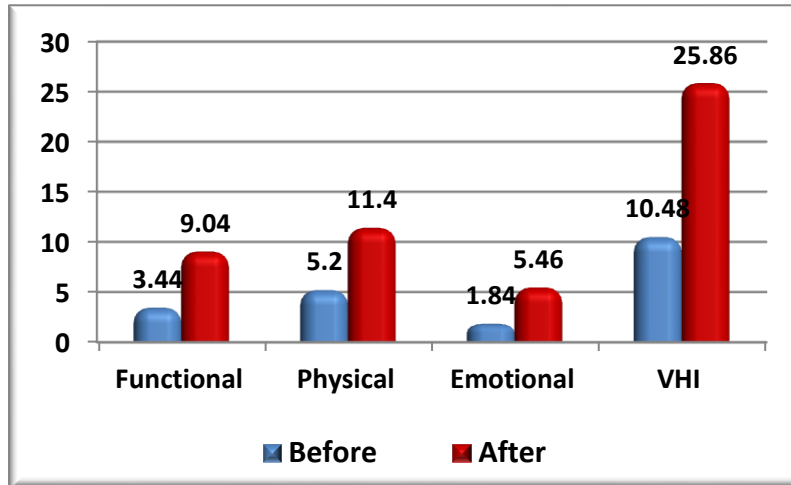
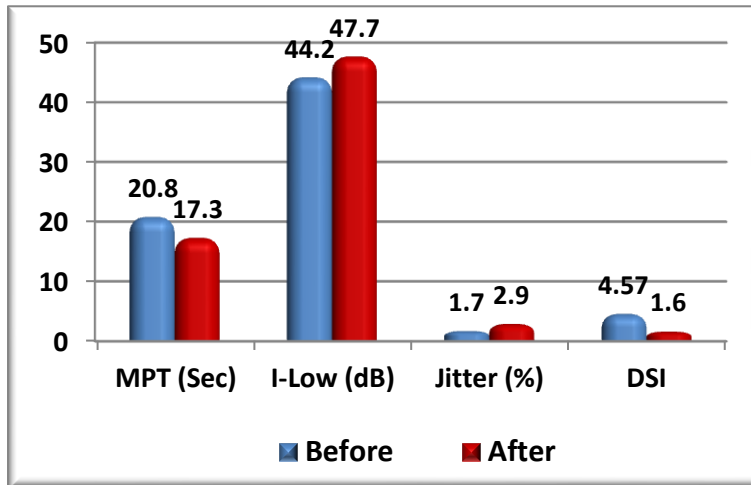
The aim of this study is evaluation of voice outcomes after various thyroid surgeries, to plan further management program and improve quality of life for these patients. This prospective non randomized uncontrolled study included 50 patients who attended the ENT and General Surgery outpatient clinics in Fayoum University hospital. The subjects underwent total and partial thyroidectomy. All Patients were subjected to both Pre as well as Post operatively (2weeks) to detailed history taking, Laryngoscopic examination, VHI, DSI and Auditory perceptual assessment (APA).

## RESULTS

1. Comparisons of patients' assessment results of DSI and VHI before and after the

operation among the study group.

Variables	Before		After		p-value	Sig.
	Mean	SE	Mean	SE		
<b>DSI</b>						
MPT (Sec)	<b>20.8</b>	0.86	<b>17.3</b>	1.02	<b>0.001</b>	<b>HS**</b>
F0-High (HZ)	<b>565.9</b>	8.1	<b>543.1</b>	7.6	<b>0.007</b>	<b>HS**</b>
I-Low (dB)	<b>44.2</b>	1.1	<b>47.7</b>	1.1	<b>0.001</b>	<b>HS**</b>
Jitter (%)	<b>1.7</b>	0.13	<b>2.9</b>	0.41	<b>0.004</b>	<b>HS**</b>
<b>DSI</b>	<b>4.57</b>	<b>0.36</b>	<b>1.6</b>	<b>0.68</b>	<b>&lt;0.001</b>	<b>HS**</b>
<b>VHI</b>						
Functional	<b>3.44</b>	1.01	<b>9.04</b>	1.06	<b>&lt;0.001</b>	<b>HS**</b>
Physical	<b>5.2</b>	1.1	<b>11.4</b>	1.7	<b>&lt;0.001</b>	<b>HS**</b>
Emotional	<b>1.84</b>	0.57	<b>5.46</b>	1.4	<b>0.008</b>	<b>HS**</b>
Total	<b>10.48</b>	2.5	<b>25.86</b>	4.5	<b>&lt;0.001</b>	<b>HS**</b>

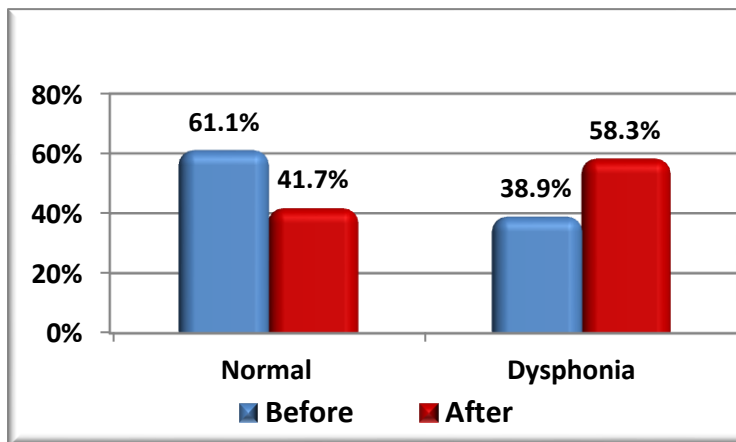


**2. Comparisons of APA before and after total-thyroidectomy among the study group.**

APA	Total -thyroidectomy	p-	Sig.
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	Before		After		value	
	No.	%	No.	%		
Normal	22	61.1%	15	41.7%	<b>0.03</b>	<b>S*</b>
Dysphonia	14	38.9%	<b>21</b>	<b>58.3%</b>		

This table shows that there was a statistically significance increase in dysphonia **after** total thyroidectomy operation.

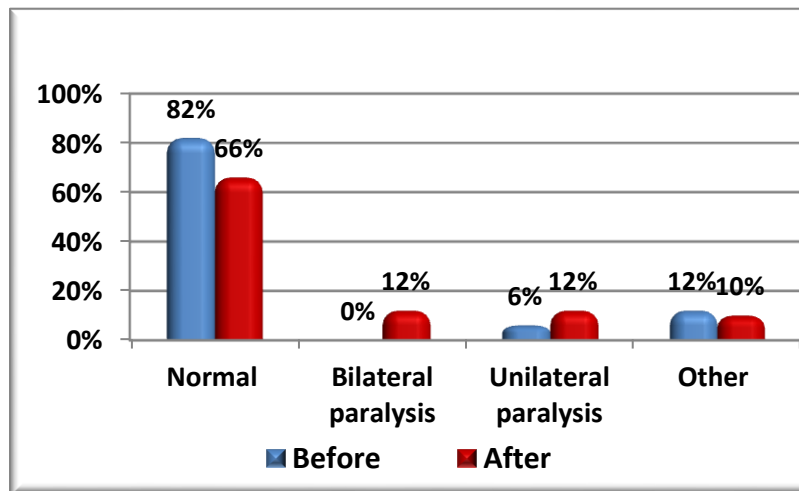


**3. Comparisons of Laryngoscopic examination before and after operation among the study group.**

Laryngoscopic examination	Before		After		p-value	Sig.
	No.	%	No.	%		

Normal	41	82%	33	66%	<b>0.001</b>	<b>HS**</b>
Bilateral paralysis	0	0%	<b>6</b>	12%		
Unilateral paralysis	3	6%	<b>6</b>	12%		
Other	6	12%	<b>5</b>	10%		

This table illustrates that there was statistically significance **increase** in occurrence of mobility problems in laryngoscopic examination **after** operation as bilateral paralysis occurred in 12% postoperative and unilateral paralysis is up to 12%.



**Correlation between DSI and VHI in different study groups.**

Variables	DSI & VHI		
	r	p-value	Sig.

<b>Among study group</b>			
Before thyroidectomy	-0.24	0.09	NS
After thyroidectomy	<b>-0.69</b>	<b>&lt;0.001</b>	<b>HS**</b>
<b>Type of thyroidectomy ( after operation)</b>			
Total	<b>-0.70</b>	<b>&lt;0.001</b>	<b>HS**</b>
Hemi	<b>-0.75</b>	<b>0.002</b>	<b>HS**</b>

r = Pearson correlation coefficient

r &gt; 0.5 = strong correlation

This table shows that there was a statistically significant **negative** correlation between DSI and VHI after operation as a total patient group as well as among each type of thyroidectomy after operation, which was indicated as a **decrease** in DSI that was associated with **increase** in VHI.

## **DISCUSSION**

The thyroid gland is in close relation with the structure of the larynx .Thus, the vocal symptoms (dysphonia) are frequent after thyroidectomy, and most of time transient. This study compared the mean value of the

DSI and its parameters, VHI and its parameters before and after the thyroid surgery as general and also among each type of thyroidectomy (hemi and total thyroidectomy) , in order to assess the effect of thyroid surgery on the degree of dysphonia. The results revealed that there

was a highly significant decrease in total DSI and increase in VHI after the surgery which may be due to nerve injury or other causes with preserved nerve function. The VHI reflect the patient complaining from his voice so it is important in determination the line of treatment.

The data in *Lee et al., (2016)* study suggest that the quality of voice deteriorated after thyroid operation, both subjectively (VHI) and objectively (DSI). In addition, this deterioration was more pronounced in total thyroidectomy patients than hemi thyroidectomy patients, which is in accordance with the findings in the current study[5].

All patient in this study underwent direct laryngoscopic examination, vocal fold paralysis (VFP) was diagnosed in 3 patients (6%) in the preoperative assessment (unilateral vocal fold paralysis), in the post-operative assessment (up to 15 days after the surgery) bilateral VFP was diagnosed in 6 patients (12%) and unilateral VFP increased from 3(6%) to 6 patients (12%).

In a study done by *Iyomasa et al., (2019)* VFP was diagnosed in 34 patients in the 1st postoperative evaluation, 32 (21%) with RLN injury and 2 (1.3%) with SLN injury. In the 6 month follow up exam, only 10 of them presented paralysis/paresis. These values indicate a high rate of nerve function recovery over the months, reducing the chances of permanent paralysis[7].

One of the limitations of this

study is that there was no long term follow up for the patients" up to 6 months" as in some cases the VFP might have been temporary and spontaneous recovery of the voice may occur on later basis.

## CONCLUSION

- This study suggest that the quality of voice deteriorated, both subjectively and objectively, after thyroid operation even in absence of VFP, this deterioration is more significant in total thyroidectomy patients
- Pre- and immediate postoperative laryngoscopic examination are useful for all patients .

## REFERENCES

- [1] **Mathur AK & Doherty GM, (2010):** "Ch. 1: Thyroidectomy and Neck Dissection". In Minter RM and GM Doherty. *Current Procedures: Surgery*. New York: McGraw-Hill.
- [2] **Gour GB, (2015):** International Journal of Computer Science and Mobile Computing; Vol.4 Issue.5, pg. 720-727.
- [3] **Stojadinovic A, Shaha AR & Orlikoff RF, (2002):** Prospective functional voice assessment in patients undergoing thyroid surgery. *Annals of Surgery*; 236:823–832.



**[4] Pereira JA, Girvent M, Sancho JJ, Parada C & Sitges-Serra A, (2003):** Prevalence of long-term upper aerodigestive symptoms after uncomplicated bilateral thyroidectomy. *Surgery*; 133:318–322.

**[5] Lee JC, Breen D, Scott A, Grodski S, Johnson W, Serpell J, (2016):** Quantitative study of voice dysfunction after thyroidectomy Presented at the 11<sup>th</sup> Academic Surgical Congress in Jacksonville, FL, Volume 160, Issue 6, Pages 1576–1581.

**[6] Iyomasa RM, Tagliarini J V, Rodrigues SA & Tavaresa EL, (2019):** Laryngeal and vocal alterations after thyroidectomy. *Brazilian Journal of Otorhinolaryngology*;85:3-10.