



Minimally Invasive Radical Thyroidectomy: A Local Preliminary Case series study for large Thyroid Cancer

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KEYWORDS

MIVAT, large goiter, radical thyroidectomy

ABSTRACT:

Background:

Minimally invasive video assisted endoscopic thyroidectomy (MIVAT) is a proven method for treating small to moderate sized thyroid swellings. However, its use for excising large goiters, such as those associated with malignant conditions, is not yet well documented.

Methods:

The current local preliminary report was designed to evaluate feasibility and efficacy of MIVAT for the radical excision of large malignant goiters.

This prospective study included patients with large malignant goiters. Patients with huge goiters or retrosternal extensions were excluded. Cervical approach was performed in all MIVAT procedures of the current study.

Results:

The study included twenty-eight patients who were 24 females and only 4 males. All patients were proved by post-operative histopathology to be malignant. They were four of the papillary type and three of follicular type. Gross post-operative weight of all of them was > 100 grams.

Conclusion:

The study highlighted the feasibility of MIVAT on the radical excision of large malignant goiter as a preliminary case series study with a limited cohort. Yet, further studies with more malignant goiters are needed for a realistic assessment of MIVAT in radical thyroidectomy for large/huge thyroid cancers.

Introduction:

Large goiter constitutes a highly challenging problems to surgeons, it is defined as a thyroid gland of a weight larger than 100 grams^{1,2}. However, massive goiter may exist when the gross weight exceeds 250 grams with substernal extension beyond the thoracic inlet³. Controversy exists as regards patient satisfaction after thyroidectomy surgery with a special emphasize on large goiter from the aesthetic point of view⁴. This issue was the trigger to initiate minimally invasive video-assisted thyroidectomy MIVAT^{4,5}.

MIVAT was introduced within the dawn of the 21st century. Since then, many clinical trials and reports were published concerning its outcome, results and patient's quality of life following this technique⁷.

Yet, few studies have discussed the role of MIVAT for radically excising malignant and/or large thyroid goiters^{6-7, 9-10}. It is associated with minimal scarring; shorter hospital stays, and lower post-operative pain. It also enables thyroidectomy to be performed as a day surgery procedure with a better cost effectiveness and less burden on healthcare facilities^{5-6, 10-11}. Nevertheless, MIVAT is not well documented as regards the oncologic safety profile in severing large malignant thyroid cancers.

MIVAT feasibility in excising large and massive goiter still constitute a high debate as regards the post-operative complication rates^{12, 13}. Many reports elaborated difficulty of MIVAT in excising large goiter that necessitates radical thyroidectomy, despite the usage of different approaches such as cervical, axillary, sublingual and anterior chest approach^{15, 16}.



The current study aimed to evaluate the feasibility and suitability of MIVAT without robotic assistance in the radical excision of large malignant goiters.

Patients & Methods:

This a prospective study which took place in the period between January 2018 to April 2021. It included patients who presented with large malignant goiters that needed a radical thyroidectomy. Excluded from the study, were those benign or who had a retrosternal extension or with gross postoperative weight of more than 250 grams.

Technique: patients were randomly selected. They underwent a thorough preoperative preparation according to a specially designed protocol¹⁷. It is based on a proper clinical assessment, plus related laboratory and imaging investigations. Laboratory assessments were; routine complete blood picture, serum Calcium and Vitamin D, renal and liver function test as well as thyroid function tests, namely; T3, T4 and TSH to assess the endocrinal function of the gland. Imaging investigations included real time and duplex Ultrasonography aiming to assess the gland size, cervical lymph node involvement as well as a thorough intra-abdominal sonography to elucidate any metastasis. Moreover, Computed tomography (CT) was performed when the duplex and/or elastographic ultrasonography failed to properly and accurately visualizes the glands pathology. Patients with large goiter who showed pressure symptoms were preoperatively prepared to facilitate the operation and decrease intra and/or post-operative hemorrhage¹⁸.

MIVAT was performed through a cervical approach in all patients as previously described^{15, 16}. post-operative laryngoscopy was offered to all patients in order to visualize the movement of the vocal cords and to account any intraoperative nerve injury. Intraoperative findings, mean operative time, intraoperative complications including hemorrhage and/or injury to surrounding structures were reported.

Collected data were statistical analyzed Obtained data were analyzed using Statistical Packages for Software Sciences (SPSS) version 26 Armonk, New York, IBM Corporation. Descriptive statistics were presented using numbers and graphs. For the comparison of variables, Student's *t*-test, Chi square test were used. *P*-value <0.05 is the significant level for all statistical tests.

Results:

Twenty-eight patients underwent MIVAT. Their age ranged from 28 to 62 years with the mean age of 36.3 ± 2.3 Twenty-four females and four males were included in the study. (Table 1) Their diagnoses varied from papillary cancer in 17 patients (60.7 %) to follicular carcinoma in 11 patients (39.3 %). (Table 2)

The mean operative time was 85 ± 30 minutes. Bipolar diathermy was used within the initial cases (12), 42.9%, while harmonic scalpel was applied on the remaining 16 patients (57.1%). No drains were used among the studied cohort as intraoperative hemostasis was optimally performed. Patients' follow-up period was 13.1 ± 10 month.

Recurrent laryngeal nerve concussion was reported in five patients (17.9%) that was amenable to optimally recover after four months of conservative management.

The overall results were expressed in (Figure 4)

Discussion:

Surgical excision of the thyroid gland remains the most popular operation in head and neck surgery. It has passed different steps and innovations through time¹⁷⁻¹⁹. Lately MIVAT through different ports has gained more popularity. However, most reports described this technique for non-hugely enlarged thyroid glands. The current study described the application of MIVAT on relatively large sized goiters due to malignancy.

In the past two decades, thyroidectomy techniques have undergone significant advancements. Initially, the MIVAT technique demonstrated superior post-operative outcomes compared to conventional thyroidectomy. However, recent publications primarily focus on hemi thyroidectomy for thyroid nodules and subtotal thyroidectomy^{17, 18, 19}. Limited attention has been given to the role of video-assisted minimal thyroidectomy as a radical procedure for treating large goiters²⁰⁻²².

The current study included 28 patients who underwent MIVAT for radical thyroidectomy. The total morbidity rate in our series was 17.9% in the form of post-operative hoarseness of voice due to nerve concussion. This can be compared to a previous series by the same author have demonstrated similar morbidity, yet, the percentage 28.6%²³. This can be explained by the increase of the learning curve and skills of the operator. Nevertheless, it



is still relatively high compared to previously published reports as regards the post MIVAT morbidity that was recorded to be 10%²⁴.

Such discrepancy in morbidity rate may be explained by the relatively larger size of the thyroid glands in the current cohort. Such data apparently expressed the difficulty of MIVAT in excising large malignant goiter compared to their benign counterparts.

The study showed no cases of conversion to classic surgical conventional thyroidectomy. This contradicts the previously published data of 14.3%²², although it does coincide with a previously published data of a meta-analytic study²⁶. The previously published data of MIVAT conversion into extended thyroidectomy is attributed to the surgeons' experience on performing the technique²⁷. Extended thyroidectomy was reported to be needed when the goiter is huge²⁸. This is contradicted by the current study data that is highly encouraging to adopt MIVAT in excising huge malignant goiter as a feasible maneuver. Intraoperative hemorrhage constitutes a major barrier to do MIVAT in huge goiters²⁷⁻³⁰. This was overcome in the current study when using the harmonic appliances in dissection and hemostasis during surgery.

It could be concluded that MIVAT is a safe and feasible tool to excise huge malignant goiter especially when the surgeon has enough experience. It also highlights the role of harmonic shears technique in alleviating the most

popular complications during the technique. However, a huge goiter in general do have the probability of injury to the parathyroid gland during dissection. Therefore, a thorough training and experience of surgeons are mandatory to be attained before adopting MIVAT to excise huge malignant goiter. Further studies with larger cohort are needed to properly highlight the notion of MIVAT feasibility for excising huge malignant goiter

Conclusion:

The study highlighted the feasibility of MIVAT on the radical excision of large malignant goiter as a preliminary case series study with a limited cohort. Yet, further studies with more malignant goiters are needed for a realistic assessment of MIVAT in radical thyroidectomy for large/huge thyroid cancers.

Table and figure legends:

Figure 1. Intra-operative MIVAT showing upper pedicle dissection

Figure 2. Intra-operative MIVAT showing Parathyroid Gland & Recurrent Laryngeal Nerve.

Figure 3. Flow chart of overall results of the study

Table 1. Age distribution

Table 2. Post-operative histopathology of the studied sample

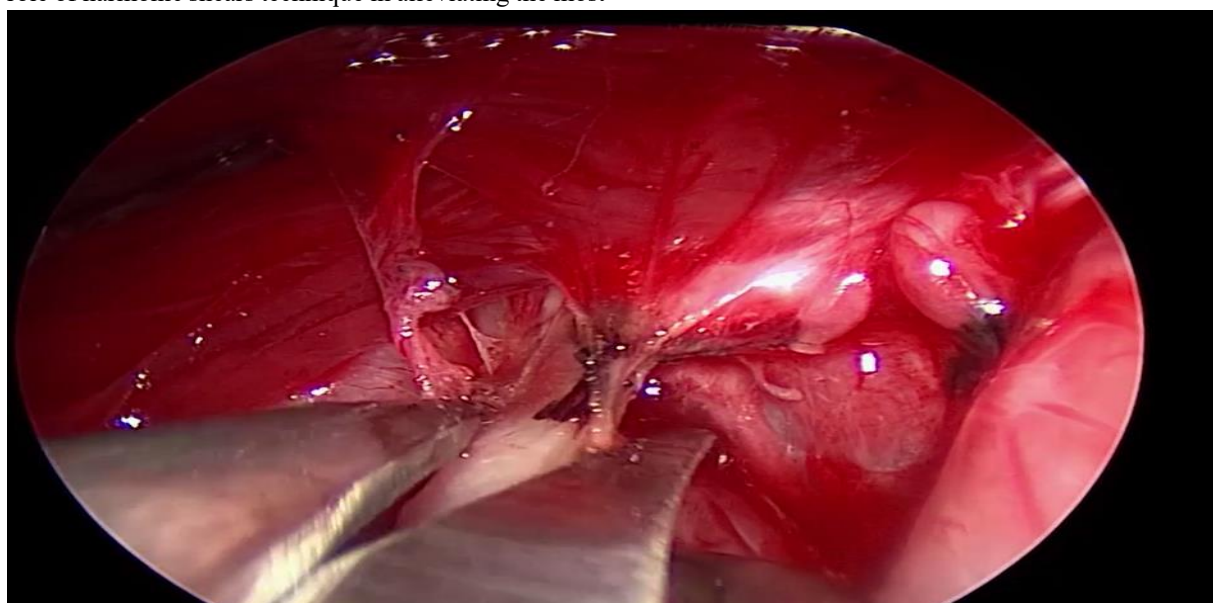


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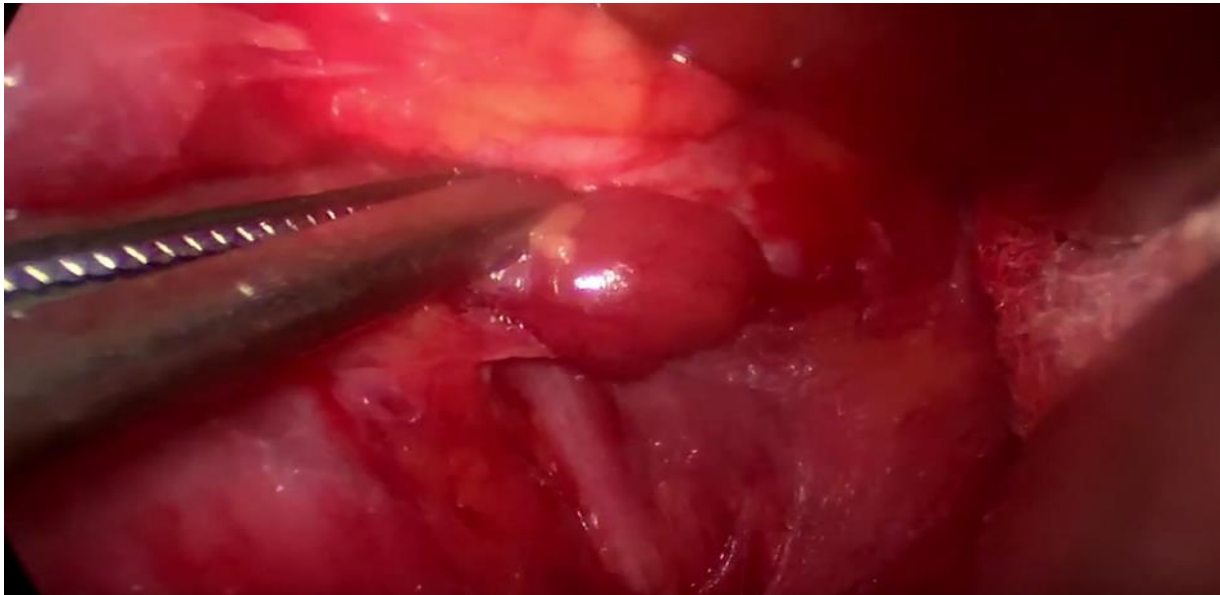


Figure 2. Intra-operative MIVAT showing Parathyroid Gland & Recurrent Laryngeal Nerve.

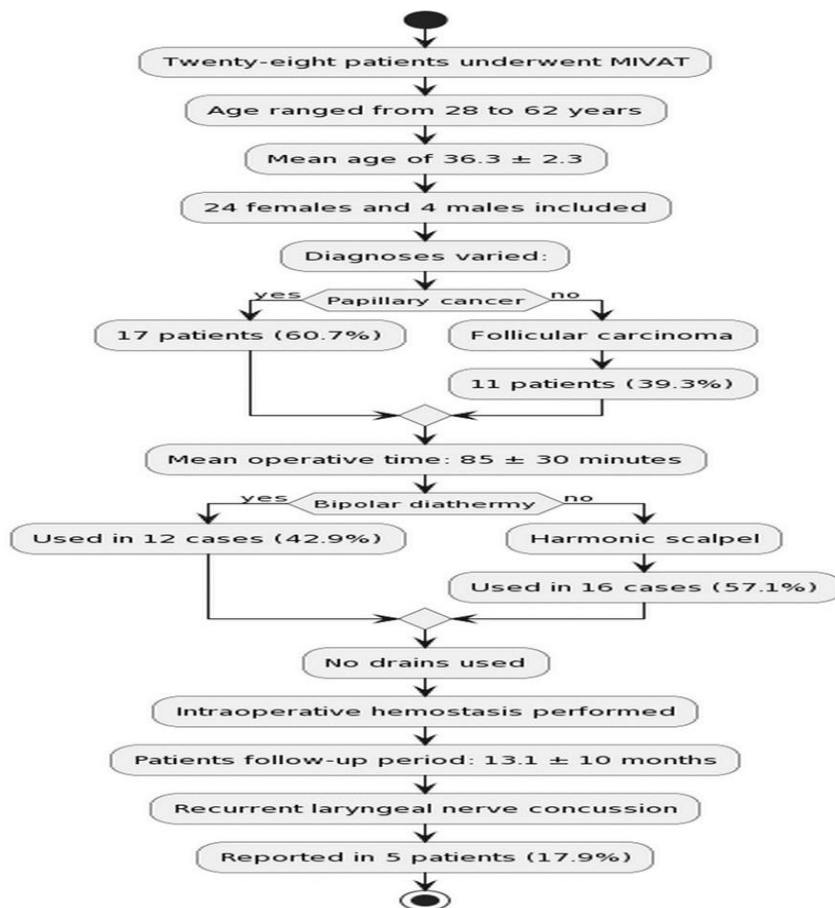


Figure 3. Flow Chart of overall results of the study.



Table 1. Age distribution of the studied sample

Age Group	Number (Percentage)
Less than 20 years	3.6 % (n = 1)
21 – 30 years	7.1 % (n = 2)
31 – 40 years	7.1 % (n = 2)
41 – 50 years	32.2 % (n = 9)
51 – 60 years	42.9 % (n = 12)
61 – 70 years	7.1 % (n = 2)

Table 2. Post-operative histopathology of the studied sample

Diagnosis	Number (Percentage)
Papillary carcinoma	60.7 % (n = 17)
Follicular carcinoma	39.3% (n = 11)

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