Sapporo Medical Journal
Volume 56, Issue 10, October 2022

Minimally Invasive Radical Thyroidectomy: A Preliminary Report

Mohamed Yasser Ibrahim Daoud[1]

[1]Department of Surgery, college of Medicine, King Faisal University, Al Ahsa, KSA.

Abstract— Minimally invasive video assisted endoscopic thyroidectomy (MIVAT) is currently well documented for treating minimal and moderate size thyroid swelling. Yet, it has not been widely used for excising large goiters. The current preliminary report was designed to evaluate feasibility and efficacy of MIVAT for the radical excision of huge goiters. This is a prospective study for the period of 24 month from January 2015 to February 2017. Patients with huge goiter were included; however, those with retrosternal extensions were excluded. Minimally invasive thyroidectomy through a cervical approach were adopted in all cases. Seven patients underwent this technique they were 6 females 85.7 % and only one male 14.3 %. The mean operative time was 2.4 hours ± 0.3 only one patient was converted into open technique due to hemorrhage. Conclusion: The obtained data of this preliminary report is encouraging to apply this technique as a routine for any case of goiter especially the huge type due to its good results. However, the cost effectiveness should be well calculated.

Keywords: MIVAT, huge goiter, radical thyroidectomy

Introduction:

Thyroidectomy of one of the commonly encountered surgical operations.[1,2] However, tremendous concerns are elaborated as regards the post thyroidectomy scars,[3] especially among females who do have a high rate of thyroidectomies.[4-5]

Minimal invasive excision of the thyroid gland is a relatively new modality that has started in the last two decades. Yet, little information is existing in the literature concerning its application in treatment of huge goiter.[2,5,6]

The technique has a higher privilege of minimal scar, reduced hospital stay and it can be applied as a day surgery procedure reducing economic pressure on exhausted health facilities.[1,2,6,7]
On the other hand, debate exists among those who are amenable to minimal invasive thyroidectomy with a low complication rate.[8,9,10] Huge goiters, thyrotoxic goiter and malignant swellings of the thyroid gland are mostly not feasible to undergo minimal invasive thyroidectomy. In these cases, radical thyroidectomy may be considered as the line of treatment.[11,12]

Minimal invasive thyroidectomy can be performed through different approaches. They include cervical, axillary sublingual as well as anterior chest approach.

The current study aimed to report our preliminary limited experience of using cervical minimally invasive radical thyroidectomy without the usage of robot for cases of huge goiters.

Patients & Methods:

Two years' prospective study took place in the period between January 2015 to February 2017. It included those patients who presented with huge goiters that necessitate a radical thyroidectomy. excluded from the study where those who had a retrosternal extension.

Technique: patients were randomly selected. They all have a specially designed a preoperative preparatory protocol which include imaging and laboratory investigations. the imaging investigatory tool were sonographic assessment of the gland, lymph node involvement as well as intra-abdominal sonography for suspected malignant cases. Some patients underwent Computed tomography scanning in cases of failure of the duplex and/or elastographic ultrasonography to accurately portray the glands pathology.Laboratory investigations included routine complete blood picture, thyroid function tests, namely; T3, T4 and TSH to assess the endocrinal function of the gland.

Patients with hyperthyroidism and huge goiter underwent treatment before being scheduled for surgery aiming to decrease intra and post-operative hemorrhage.

All patients underwent endoscopic thyroidectomy via the cervical approach after being well prepared. intraoperative findings, mean operative time, intraoperative complications including hemorrhage and/or injury to surrounding structures were reported. Collected data were statistical analyzedObtained 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 was used. P-value <0.05 has been accepted as the significant level for all statistical tests.

Results:

Seven patients underwent minimal cervical thyroidectomy. their age ranged from 16 to 58 years with the mean of 33.1± 22. 6 females (85.7 %) and one male (14.3 %) were encountered in the study.(Table 1)Patients diagnosis varied from huge multinodular goiter in 4 patients (57.1%), suspected malignant goiter in two patients (28.6%) and one patient with huge secondary toxic goiter (14.3%).(Table 2) One patient underwent auto transfusion of one units of blood during preparation for surgery due to low hemoglobin level (suspected malignant goiter). MIVAT was performed via a cervical approach as previously described.[13,14]

The mean operative time ranged from 2.4 hours ± 0.3.in one patient wound extension was obliged due to intraoperative hemorrhage. Bipolar diathermy was used in the initial three cases, yet, due to a massive uncontrolled hemorrhage in one case harmonic shear was used for a proper ligation of all vessels during the procedure within the remaining four cases. A sterile rubber band was inserted in four patients who showed a bloody field during the operation. On the other hand, no drains were used among the remaining patients. Follow up period ranged from 2 months up to one year with a mean of 6.2 ± 1.4 month. All patients had an uneventful post-operative period with minimal morbidity.Two patients (malignant goiter) presented with mild hoarseness of voice due to nerve concussion. These cases positively responded to conservative management and voice rehabilitation.

Discussion:

Conventional thyroidectomy has been considered as the classical treatment for excision of the gland nearly over a century since it was initially described in Zurich by Theodore B Kocher[15]. through years many advances were applied in the procedure including strict antiseptic precautions, intraoperative care of the parathyroid gland, this led to a dramatic decrease of the mortality after simple goiter thyroidectomy to become less than 1%. Therefore, Kocher was awarded the Nobel prize in 1909.[16]

With the dawn of the new millennium minimal access thyroidectomy techniques were initially described by many surgeons. It depends on the use of the video assisted minimally invasive

technique to make advantages of the endoscopic technology. Most of publications are describing and discussing the hemithyroidectomyfor thyroid nodules or even subtotal thyroidectomy[17,18,19]. Nevertheless, to date few have discussed the role of the video assisted minimal thyroidectomy as a radical procedure in treatment of huge goiter.[20,21,22]

The current study presented a preliminary report of the experience of MIVAT for radical thyroid removal for huge goiter.

The overall morbidity in the current preliminary report was 28.6%. It only included intraoperative left recurrent laryngeal nerve concussion that was amenable to treatment. This is higher than the overall morbidity among MIVAT that reached 10%.[22]

The conversion rate to conventional thyroidectomy was 14.3% compared to 3.3% in a meta analytic study 22. The considerable higher rate of conversion in our series may not be of value as it was 1 out 7, yet, the previously published conversion rate discussed cases of small thyroid enlargement compared to the huge goiter in our preliminary report. Moreover, the reason for conversion on the meta analytic study was describing initial experience of technical difficulties due to a new demanding technique.[23]

Cases in our report were all performed by a senior surgeon who is experienced in the technique with considerable number of similar operations in small goiters.it was reported that the commonest cause abortion of MIVAT technique during surgery is the underestimation of the thyroid volume that was considered the most crucial limitation for the technique. [24] This notion is clearly contradicted by the results of our current report. Intraoperative hemorrhage was described to be limited during MIVAT, yet, we experienced one case of profuse hemorrhage that necessitates the conversion of the technique. This is attributed to the nonuse of the shear harmonic ablation in one of the initial cases. The use of harmonic dissection and ligation aided in limitation of hemorrhage creating a clean and clear safe operation as previously described.[25]

Despite the large size of the excised gland we managed to reduce operative trauma with its consecutive edema reducing the post-operative pain simulating others reports. [23,25,26]

The overall success rate of our report is satisfactory as it compared radicality of thyroid excision for huge goiter compared to other multicentric reports of relatively smaller sized gland.22 The current report is paving the road to adopt the MIVAT as a safe, feasible with minimal complications as a standard for treating complex huge goiters including lymph node removal with less burden on the parathyroid glands specially in cases of grave's disease.

Limitations are considered as this is a preliminary study. therefore, further reports with bigger cohorts may be needed for better understanding and highlighting the role of MIVAT as an effective tool of excising a huge thyroid gland.

Conclusion:

The obtained data of this preliminary report is encouraging to apply this technique as a routine for any case of goiter especially the huge type due to its good results. However, the cost effectiveness should be well calculated.

Table and figure legends:

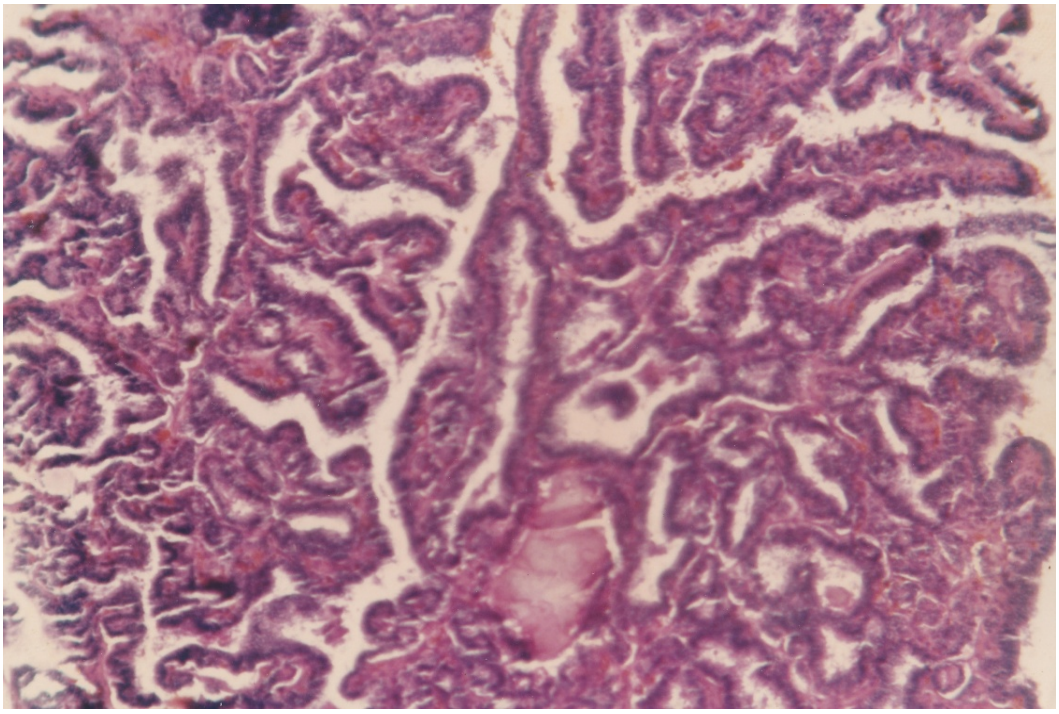

Figure 1: papillary carcinoma – 53-year-old female -postoperative histopathology
Microscopy: Photomicrograph shows Papillary adenocarcinoma of the thyroid gland showing numerous ramified papillary vegetation with thin axis of vascular connective tissue. The cells appear heaped up with features of nuclear clearing.(H&E x100)

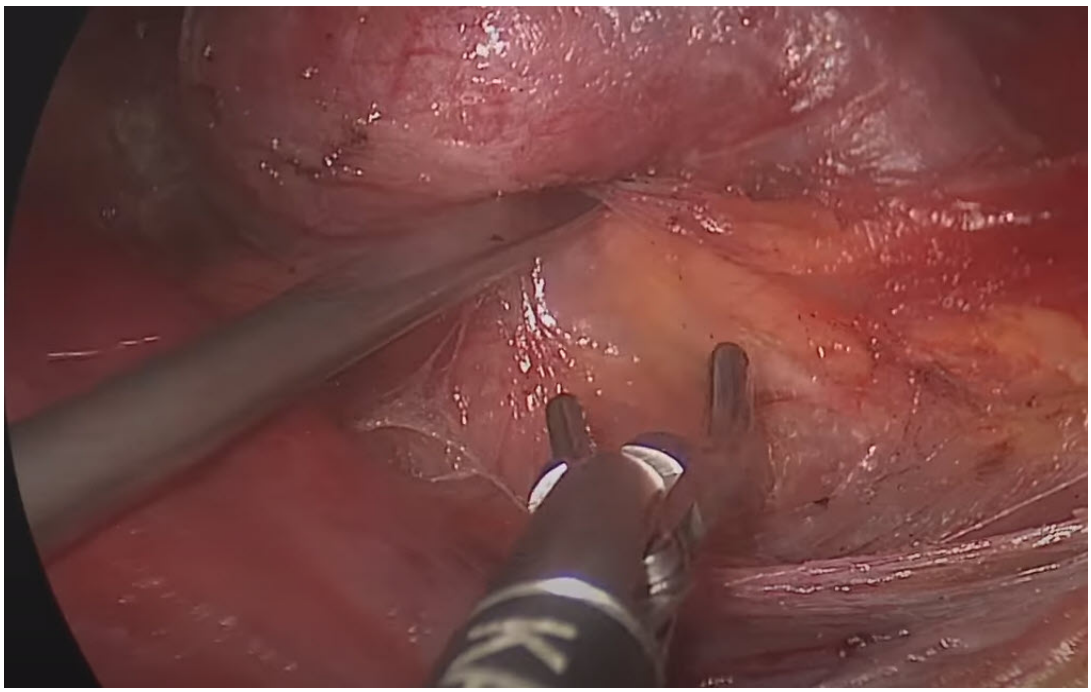

Figure 2. Intra-operative MIVAT showing pedicle dissection.

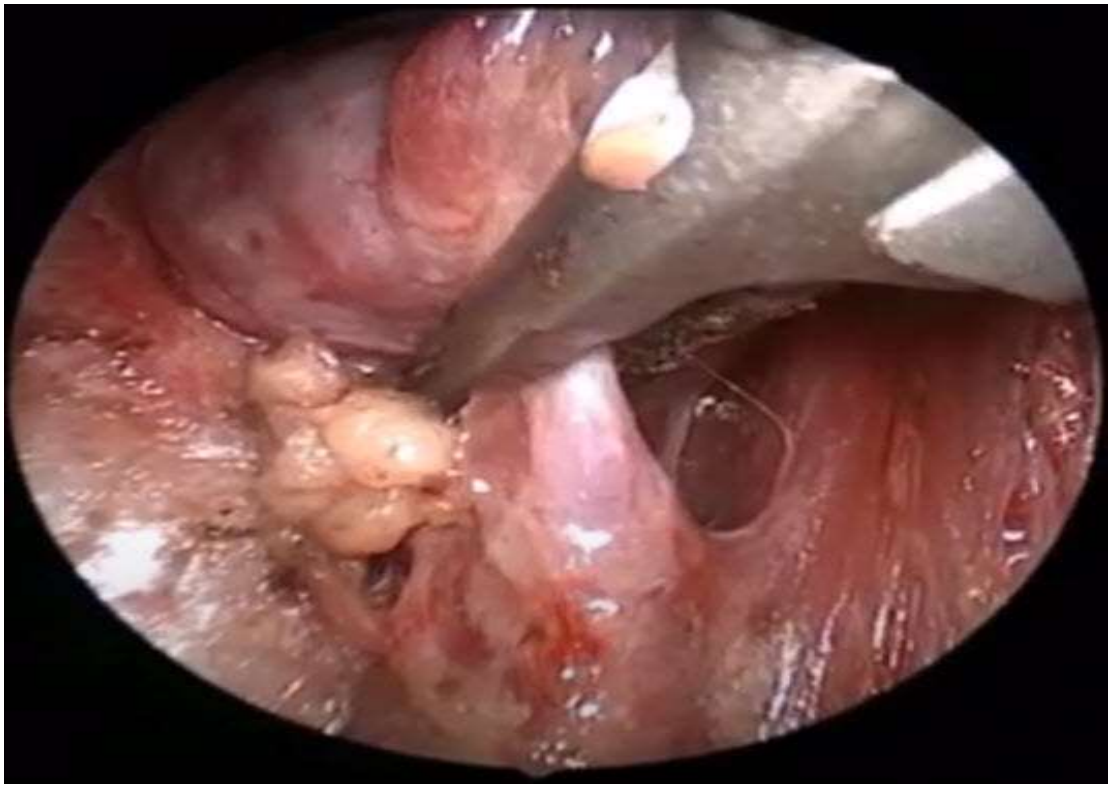

Figure 3. Intra-operative MIVAT showing vessel ligation by harmonic shear.

Table 1. Age distribution of the studied sample

Age Group	Number (Percentage)
Less than 20 years	14.3% (n = 1)
21 – 30 years	14.3% (n = 1)
31 – 40 years	14.3% (n = 1)
41 – 50 years	28.6 % (n = 2)
51 – 60 years	28.6 % (n = 2)

Table 2. Post-operative histopathology of the studied sample

Diagnosis	Number (Percentage)
Simple Multinodular Goiter	57.1% (n = 4)
Secondary Toxic Goiter	28.6% (n = 2)
Malignant Goiter (Papillary Carcinoma)	14.3% (n = 1)

Declarations:

Ethics approval and consent to participate

Research was conducted after obtaining the institutional researchers' board (IRB) of King Faisal University.

Consent for publication

We authorize the journal for publication of identifying images or other personal or clinical details of participants that compromise anonymity. (Not applicable)

Availability of data and material

All data and material are available upon request

Competing interests

The author declares that there is no compete or conflict of interests regarding the publication of this article.

Funding

Self-funded none granted research

Acknowledgements

'Not applicable'

References:

[1] Harness JK, Fung L, Thompson NW, Burney RE, McLeod MK. Total thyroidectomy: complications and technique. World journal of surgery. 1986 Oct;10(5):781-5.

[2] Lifante JC, Payet C, Ménégaux F, Sebag F, Kraimps JL, Peix JL, Pattou F, Colin C, Duclos A, Arnalsteen L, Caizzo R. Can we consider immediate complications after thyroidectomy as a quality metric of operation? Surgery. 2017 Jan 1;161(1):156-65.

[3] Dordea M, Aspinall SR. Short and long-term cosmesis of cervical thyroidectomy scars. The Annals of The Royal College of Surgeons of England. 2016 Jan 1;98(1):11-

[4] Serpell JW, Phan D. Safety of total thyroidectomy. ANZ journal of surgery. 2007 Jan;77(1-2):15-9.

[5] Abdelgadir Adam M, Speicher P, Pura J, Dinan MA, Reed SD, Roman SA, Sosa JA. Robotic thyroidectomy for cancer in the US: patterns of use and short-term outcomes. Annals of surgical oncology. 2014 Nov;21(12):3859-64.

[6] Del Rio P, Viani L, Montana CM, Cozzani F, Sianesi M. Minimally invasive thyroidectomy: a ten years experience. Gland surgery. 2016 Jun;5(3):295.

[7] Bakkar S, Materazzi G, Biricotti M, De Napoli L, Conte M, Galleri D, Aghababyan A, Miccoli P. Minimally invasive video-assisted thyroidectomy (MIVAT) from A to Z. Surgery today. 2016 Feb;46(2):255-9.

[8] Miccoli P, Bellantone R, Mourad M, Walz M, Raffaelli M, Berti P. Minimally invasive video-assisted thyroidectomy: multiinstitutional experience. World journal of surgery. 2002 Aug;26(8):972-5.

[9] Dralle H, Machens A, Thanh PN. Minimally invasive compared with conventional thyroidectomy for nodular goitre. Best Practice & Research Clinical Endocrinology & Metabolism. 2014 Aug 1;28(4):589-99.

[10] Miccoli P, Biricotti M, Matteucci V, Ambrosini CE, Wu J, Materazzi G. Minimally invasive video-assisted thyroidectomy: reflections after more than 2400 cases performed. Surgical Endoscopy. 2016 Jun;30(6):2489-95.

[11] Touzopoulos P, Karanikas M, Zarogoulidis P, Mitrakas A, Porpodis K, Katsikogiannis N, Zervas V, Kouroumichakis I, Constantinidis TC, Mikroulis D, Tsimogiannis KE. Current surgical status of thyroid diseases. Journal of Multidisciplinary Healthcare. 2011 Dec 14;4:441-9.

[12] Randolph GW. Surgery of the thyroid and parathyroid glands. Elsevier Health Sciences; 2020 Mar 14.

[13] Miccoli P, Berti P, Raffaelli M, et al. Minimally invasive videoassistedthyroidectomy. Am J Surg 2001;181:567–570.

[14] Miccoli P, Berti P, Raffaelli M, et al. Comparison between minimally invasive video-assisted thyroidectomy and conventional thyroidectomy: a prospective randomized study. Surgery 2001;130:1039–1043.

[15] Giddings AE. The history of thyroidectomy. Journal of the royal society of medicine. 1998 Dec;91(33_suppl):3-6.

[16] Chiesa F. The 100 years Anniversary of the Nobel Prize Award winner Emil Theodor Kocher, a brilliant far-sighted surgeon. Acta otorhinolaryngologica Italica: organo ufficiale della Societa italiana di otorinolaringologia e chirurgia cervico-facciale. 2009 Dec 1;29(6):289-.

[17] Takami H, Ikeda Y. Minimally invasive thyroidectomy. ANZ Journal of Surgery. 2002 Nov;72(11):841-2.

[18] Terris DJ, Gourin CG, Chin E. Minimally invasive thyroidectomy: basic and advanced techniques. The Laryngoscope. 2006 Mar;116(3):350-6.

[19] Takami HE, Ikeda Y. Minimally invasive thyroidectomy. Current opinion in oncology. 2006 Jan 1;18(1):43-7.

[20] Wilhelm T, Metzig A. Endoscopic minimally invasive thyroidectomy: first clinical experience. Surgical endoscopy. 2010 Jul;24(7):1757-8.

[21] Miccoli P, Minuto MN, Ugolini C, Pisano R, Fosso A, Berti P. Minimally invasive video-assisted thyroidectomy for benign thyroid disease: an evidence-based review. World journal of surgery. 2008 Jul;32(7):1333-40.

[22] Pisanu A, Podda M, Reccia I, Porceddu G, Uccheddu A. Systematic review with meta-analysis of prospective randomized trials comparing minimally invasive video-assisted thyroidectomy (MIVAT) and conventional thyroidectomy (CT). Langenbeck's archives of surgery. 2013 Dec;398(8):1057-68.

[23] Pons Y, Vérillaud B, Blancal JP, Sauvaget E, Cloutier T, Le Clerc N, Herman P, Kania R. Minimally invasive video-assisted thyroidectomy: learning curve in terms of mean operative time and conversion and complication rates. Head & neck. 2013 Aug;35(8):1078-82.

[24] Lombardi CP, Raffaelli M, Princi P, Lulli P, Rossi ED, Fadda G, Bellantone R. Safety of video-assisted thyroidectomy versus conventional surgery. Head & neck. 2005 Jan;27(1):58-64.

[25] Bellantone R, Lombardi CP, Bossola M, Boscherini M, De Crea C, Alesina PF, Traini E. Video-assisted vs conventional thyroid lobectomy: a randomized trial. Archives of Surgery. 2002 Mar 1;137(3):301-5.

[26] Sgourakis G, Sotiropoulos GC, Neuhäuser M, Musholt TJ, Karaliotas C, Lang H. Comparison between minimally invasive video-assisted thyroidectomy and conventional thyroidectomy: is there any evidence-based information? Thyroid. 2008 Jul 1;18(7):721-7.