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Application of minimal invasive technique for thyroidectomy without remote access in locally advanced thyroid carcinoma with gross extra-thyroidal extension

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ABSTRACT

INTRODUCTION: Minimally invasive thyroidectomy (MIT) is technically less damaging tissue and is better cosmetic results with small neck scar, decreasing postoperative pain and neck discomfort. We present the experience of MIT without remote access with case of grossly extra-thyroidal extension positive papillary thyroid carcinoma.

PRESENTATION OF CASE: A 44-year-old, female presented 1.6 cm irregular hypoechoic nodule at upper pole in Right thyroid gland and diagnosed to papillary thyroid carcinoma. The tumor was suspicious to have extra-thyroidal extension. We performed MIT without remote access for this patient with 2 cm cervical incision. Postoperative course was uneventful and patient was discharged on the 3th postoperative day. At present, she is taking 100mcg levothyroxine and is free of disease 3 years post-surgery.

CONCLUSION: If experienced surgeons can get sufficient resection margin and control bleeding of superior thyroid artery, MIT without remote access can be feasible method for thyroid carcinoma with gross extra-thyroidal extension, especially, upper pole carcinoma.

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1. Introduction

The conventional technique for thyroidectomy requires a long collar incision, wide skin flaps on the anterior neck, and a long vertical dissection of the strap muscles to provide exposure of thyroid gland and enough operative fields. This surgical approach inevitably make wide neck scar and cause neck discomfort related with dissection of the strap muscles.

Minimally invasive thyroidectomy (MIT) is technically less demanding, based on experiences from parathyroid surgery [1]. Ferzli et al. first reported MIT with tough 2.5 cm cervical incision [2]. The goals of minimally invasive approaches are better cosmetic results with small neck scar, decreasing postoperative pain and neck discomfort, and shortening of hospital stay periods without postoperative complications [3]. Recently, MIT is useful and famous technique that is being applied to thyroid carcinoma. Nevertheless, Cases with advanced thyroid carcinoma, especially, grossly extra-thyroidal extension positive cancer, are rarely reported. Therefore, we present the experience of MIT without remote access with case

of grossly extra-thyroidal extension positive papillary thyroid carcinoma. The work has been reported in line with the SCARE 2018 criteria [4].

2. Presentation of case

A 44-year-old female, without any medical history, visited ambulatory center in tertiary hospital with abnormal findings of neck ultrasonography (US) in routine health check-up. She presented no symptoms at visit. Initial work up using neck US presented 1.6 cm irregular hypoechoic nodule at upper pole in Right thyroid gland. Furthermore, right thyroid gland nodule was suspicious to have extra-thyroidal extension (ETE) (Figs. 1 and 2), but regional neck lymph nodes (LNs) enlargement was not found in neck US examination. FNAB was done at right thyroid nodule and pathology result was papillary thyroid carcinoma (PTC) (Category VI with Bethesda system). We decided surgical treatment with informed consensus. According to tumor size, LN metastasis and tumor extent, we planned right lobectomy with isthmusectomy with prophylactic right central compartment neck dissection (CCND). Although tumor had ETE, we performed lobectomy with isthmusectomy if tumor did not invade to strap muscles. Finally, we performed MIT for this patient. In operation field, if tumor invaded to right strap muscles, we were going to change the surgical technique from MIT to conventional open thyroidectomy for

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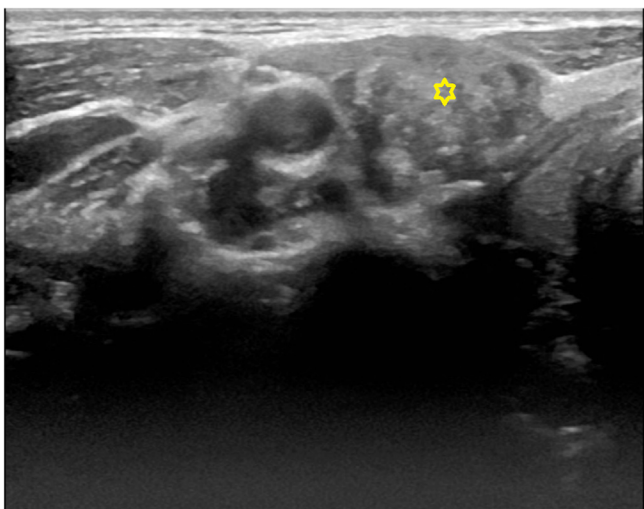


Fig. 1. Ultra-sonographic feature with transection view. It shows 1.6 cm thyroid nodule at right thyroid upper pole.

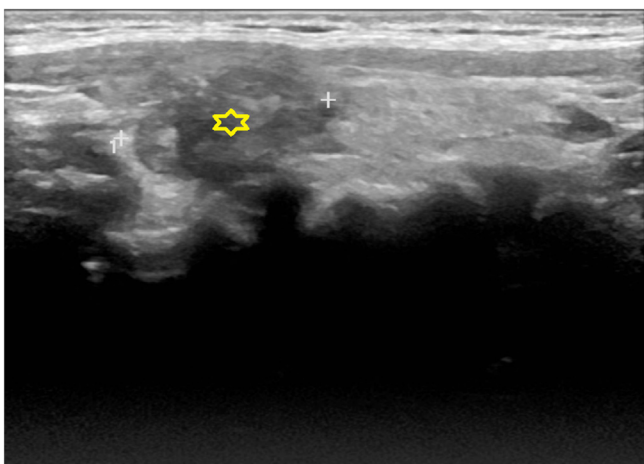


Fig. 2. Ultra-sonographic feature with longitudinal view. The tumor was suspicious to have extra-thyroidal extension.

bilateral total thyroidectomy. Furthermore, we performed prophylactic right CCND because there was no evidence for clinical LN metastasis. Clinical assistant professor with 7-years of experience in thyroid surgery performed the operation.

We made 2 cm transverse cervical incision along the neck skin crease on the right lateral neck, two fingers away from the sternum notch (Fig. 3). Electrocautery is used to divide the platysma and to dissect medial border of the sternocleidomastoid muscle laterally. Then, Dissection was done between lateral border of right strap muscle from anterior surface of thyroid gland. After thyroid gland exposed, we retracted lateral border of right strap muscle medially and resected thyroid gland from isthmus to upper pole of right thyroid gland. After these procedures, right thyroid gland could be mobilized (Fig. 4). Thus, surgical field could be obtained by means of elevation and medial traction of the right thyroid gland outside the wound, and by lateral retraction of the wound. After these steps, the surgical procedures for identifying the recurrent laryngeal nerve and the parathyroid glands were identical to the conventional open thyroidectomy. We finished surgery with small band dressing (Fig. 5).

In surgical findings, right thyroid upper pole nodule had grossly ETE, but did not invade into right strap muscles. Central compartment neck LN enlargement was also not found.



Fig. 3. Incision on anterior neck. 2 cm transverse cervical incision.

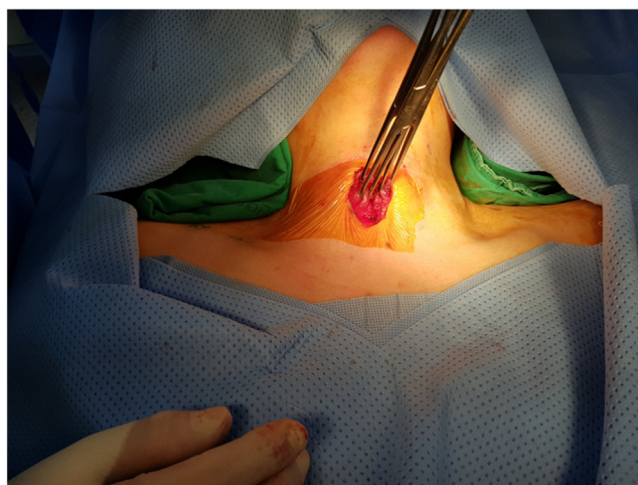


Fig. 4. Mobilized thyroid by dissection outside the wound.



Fig. 5. Small wound with band dressing.

The pathologic result of thyroid nodule was PTC. ETE was identified and out of five retrieved LNs, one intra-nodal confined LN micro-metastasis was noted. Resection margin was free from tumor. Resected right thyroid was 6.3 g in weight and

3.8 × 2.5 × 1.5 cm in dimensions. Postoperative radioactive iodine treatment was not performed.

Postoperative course was uneventful and patient was discharged on the 3th postoperative day. We regularly followed her by neck US and serum thyroglobulin testing at 6month intervals to check local recurrences. At present, she is taking 100mcg levothyroxine (LT4) and is free of disease 3 years post-surgery. The Institutional Review Board of Pusan National University Hospital approved this study and informed consent was obtained.

3. Discussion

There have been more than 20 techniques for MIT over the last 20 years. Italian groups first reported MIT techniques [5–9] and American groups made an enthusiastic ovation for MIT [10,11]. They reported that MIT technique makes patients more satisfied because the neck incision is smaller and makes patients feel less postoperative pain. They also reported that MIT technique shortens the duration of postoperative hospital stay and decreases wound healing time compared to conventional open thyroidectomy. However, another group reported there is no scientific evidence that patient satisfaction improves with a smaller scar [12]. Furthermore, some groups argued that there is no less pain after MIT compared with conventional open thyroidectomy [13]. Alesina et al. revealed that the length of the skin incision does not influence postoperative pain [13]. Although these conflicting arguments, MIT is still considered feasible for small thyroid nodule less than 2 cm diameters [14].

Recently, MIT is useful and famous technique that is being applied to thyroid carcinoma. Most common indications for thyroidectomy using minimally invasive technique included unilateral, atypical thyroid nodules or follicular lesions less than 3 cm diameters and solitary toxic nodule [15]. Thyroid carcinomas proven by fine needle aspiration biopsy (FNAB) were considered ineligible to MIT [15]. However, recently, paradigm for treatment of thyroid carcinoma has been changed; thyroid carcinomas requiring hemi-thyroidectomy are considered eligible to MIT and many studies revealed MIT with or without remote access were safe and applicable for thyroid carcinoma requiring hemi-thyroidectomy [3,5,15]. With remote access (robot-assisted or endoscopic assisted or video-assisted), MIT is recognized to be very effective in the treatment of thyroid carcinoma regarding to safety and cosmetic outcome [16–19]. In contrast, there are few studies related to MIT without remote access. However, MIT without remote access is still useful and applicable in thyroid disease and carcinoma regarding to cost effect and cosmetic outcome [20,21].

Traditionally, most common indications for thyroidectomy using minimally invasive technique without remote access included unilateral, follicular lesions less than 3 cm diameters [15] and recently, thyroid carcinomas requiring hemi-thyroidectomy are also considered eligible to MIT without remote access [3,5,15]. However, it is still recognized that MIT without remote access is not appropriate in thyroid carcinoma with gross ETE because of insufficient oncologic outcome and the possibility of nerve damage [15]. In particular, thyroid upper pole carcinoma is not indication for MIT without remote access due to the risk of uncontrolled bleeding at superior thyroid artery. But, in our case, we treated thyroid upper pole carcinoma with gross ETE using MIT without remote access with clear resection margin and no bleeding risk.

In our case, resected right thyroid was 6.3 g in weight and 3.8 cm in dimension. There were few studies about which volume of thyroid could be applied with MIT. We think the volume of thyroid does not significantly affect the operative technique with MIT unless it is a huge goiter over 4 cm. The height of the upper pole rather than the volume of thyroid affect the success of this surgical

technique. The higher the level of the upper pole of thyroid, the harder it is to perform operation with this technique.

4. Conclusion

We carefully suggest that if experienced surgeons can get sufficient resection margin and control bleeding of superior thyroid artery, MIT without remote access can be feasible method for thyroid carcinoma with gross ETE, especially, upper pole carcinoma. However, there are still questionable debates regarding to oncologic outcomes and further following study will be needed.

Declaration of Competing Interest

The authors report no declarations of interest.

Sources of funding

We have no funding for research.

Ethical approval

The Institutional Review Board of Pusan National University Hospital approved this study.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Registration of research studies

No registration is needed for this work.

Guarantor

Jung Bum Choi, MD and Dong-il Kim, MD. accept full responsibility for the work.

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CRediT authorship contribution statement

Jung Bum Choi: Writing - original draft. **Byoung Chul Lee:** Writing - review & editing. **Young Mok Park:** Writing - review & editing. **Hyuk Jae Jung:** Writing - review & editing. **Dong-il Kim:** Supervision.

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