



MINIMAL ACCESS THYROID SURGERY- A REVIEW

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ABSTRACT

The concept of surgical invasiveness can't be just limited to the size of skin incision. It should be extended to the structure dissected during the surgery. Therefore, minimal invasive thyroid surgery should be properly explained as surgery through small incision that allows direct access to thyroid gland resulting focused dissection. Since the first report of endoscopic subtotal parathyroidectomy performed by Gagner et al. in year 1996, numbers of minimal invasive approaches and endoscopic surgery have been introduced such as MIVAT, endoscopic lateral approach, anterior chest approach, trans-axillary approach, axillo-breast approach, post auricular approach and some other novel techniques such as Robotic Assisted Thyroidectomy (RAT). The minimal invasive approach to the thyroid gland is simply classified into cervical or direct approach and extra cervical or indirect approach. All of the techniques have their own merits and demerits. Therefore, none of the technique is superior to other. The choice of surgery is determined by the surgeons own experience and patient's preference. Demonstrating the advantage of MIT is over conventional open thyroidectomy is not so easy. However, several studies shows cosmetic outcome and postoperative pain with MIT is better in comparison to conventional open thyroidectomy.

Key words: minimally invasive thyroid surgery, endoscopic thyroidectomy, conventional open thyroidectomy, scarless

INTRODUCTION

Thyroidectomy is one of the most common performed surgical procedures. Conventional open thyroidectomy remains the treatment of choice for benign and malignant thyroid nodules since ages. Despite of safe dissection and low morbidity in experience hand some patients are left with relatively prominent scar. The incidence of thyroid disease in young female are increasing rapidly, cosmesis plays vital role in thyroid surgery. As a result, Surgeons and patients aim to minimize the length of surgical incision or change the location of incision outside the neck.

For the shake of better safety and surgical outcome of elective surgical procedures, many thyroid surgeons adopted various new technologies like post-operative parathyroid hormone assay, intraoperative neuro-monitoring of Recurrent Laryngeal Nerve (RLN) and alternative energy device such as bipolar coagulation or ultrasonic shears, three dimensional (3D), high definition (HD) camera system. Any procedure which involves using endoscope is often called as endoscopic thyroidectomy.

Endoscopic thyroidectomy has generated great interest among thyroid surgeons since Gagner et al. in the year 1996 and Huscher et al. in 1997 perform first endoscopic parathyroidectomy and thyroidectomy respectively. There after number of minimal invasive approach and endoscopic surgery have been introduced including Minimal Invasive Video Assist Thyroidectomy (MIVAT), endoscopic lateral approach, cervical, breast, anterior chest approach etc. Those procedures were classified into cervical or direct approach and extra - cervical or indirect approach.

Cervical or direct approach is considered as truly minimal invasive since the incision are smaller in compare to conventional open approach and amount of surgical dissection is also less, since incision are made in neck area so that thyroid gland can be directly exposed as conventional open thyroidectomy but with the help of endoscopic instruments. Whereas in extra cervical or indirect approach incisions are made outside the neck area or extra cervical regions like axillary region areolar region. No visible scar is seen in this approach which is the main beneficial reason. However, this approach is criticized for extensive subcutaneous dissection which is not considered as minimal invasive technique. This review describes the various endoscopic thyroidectomy techniques.

Cervical or Direct Approach:

Minimal Invasive Video Assisted Thyroidectomy (MIVAT) :

This procedure was first described by group of Italian surgeons in the year 1998. It gains quick popularity because it is minimal invasive and use of endoscope gave magnified view of operative field to surgeons. This procedure requires both conventional open and laparoscopic surgical skills. This technique is performed without insufflation of gas which involves 15-20mm incision 2cm above sterna notch, dissection of

strap muscle and insertion of endoscope. Better cosmetic outcome, less postoperative pain, short hospital stay are major beneficial aspect of this MIVAT.

Endoscopic lateral approach:

This approach was first described by Henry et al. in year 1999. In this approach 15 mm transversal incision is made on anterior border of Sternocleidomastoids (SCM) 3-4 cm above the sternal notch, thyroid gland is approach laterally by splitting of strap muscle and SCM. Unilateral access require three ports (one 10 mm and two 2.5 mm) which are inserted along the medial border of SCM. Operating space is maintained with CO2 insufflation at low pressure around 8 mmHg.

Since the incision is place on one side of neck, only unilateral pathology can be resected which is main disadvantage of this approach. For exploration of contralateral side in same setting; extension of incision (collar incision) is required.

Lateral mini-incision technique:

This technique is similar to lateral endoscopic approach as the thyroid gland is approached by entering a plane between strap muscle and SCM but this technique is done in open method instead of using endoscopic instruments. Delbridge et al. first describe the technique in which 2-2.5cm sized incision is made over the nodule. This technique is easier to learn as compare to other endoscopic surgery; however this approach is limited for unilateral thyroid lobectomy.

Extra cervical or Indirect Approaches:

Anterior chest / Breast approach

In year 1998 Shimizu et al. reported their experience of thyroid gland approach via infraclavicular incision. The main aim of this approach was to be “scarless” over neck and termed it as VANS, but scar couldn't be covered properly. In 2000 ohgami et al. modified the incision by placing it to upper circum-areolar region. Though some patient doesn't want dissection around areolar region because of breast implant is concern.

First incision is made at bilateral upper circum-areolar or infraclavicular or region. Sub platysmal plane is created by blunt dissection. Operating space is maintained by skin lifting device or carbon dioxide insufflation at low pressure. Thyroid gland is exposed by longitudinal division of strap muscle.

Trans-Axillary approach:

In year 2000 Ikeda et al. describe this approach for the first time. In this approach patient lie in supine position and put under general anesthesia. The neck is slightly extended and ipsilateral arm is raised and fixed.

This approach requires three incisions (one 10 mm and two 5 mm) placed below the anterior axillary line. With blunt dissection initial plane is developed on top of pectoralis major muscle. Operating space is maintained by Carbon dioxide gas insufflation at low pressure.

This approach avoid scar over the neck so, the approach offers good cosmetic outcome and less subcutaneous dissection is required since distance between incision and thyroid gland is short. However, dissection of contralateral side is difficult and collision of instrument is common due to limited operating space.

Axillo-Breast Approach:

To overcome the technical difficulties faced in anterior approach and trans-axillary approach, both axillary and breast incision so called axillo bilateral breast approach (ABBA) was introduced. This approach was first described by Shimazu et al. Incision is made in ipsilateral upper circum-areolar region. Subcutaneous operating space is created by blunt dissection. Operating space is extended from anterior chest to thyroid cartilage superiorly and laterally to the medial border of Sternocleidomastoids (SCM). Carbon dioxide gas was insufflated in low pressure in order to maintain working space. This approach has advantage of good visual field and wide operating space. This approach is valid for bilateral access.

Choe et al. modify this approach by adding another incision to contralateral axilla to enhance visualization of thyroid gland and termed as bilateral axillo-breast approach (BABA). This approach is valid for bilateral access. However, the technique is criticized for being maximally invasive as it involves extensive dissection of subcutaneous flap to create working space.

Post Auricular and Axillary Approach:

Many patient especially young female are concerned to have their breast involved, this technique avoid peri-areolar region dissection and also maintain triangulation of manipulation at same time. Lee et al. reported this approach by making incision at post auricular and bilateral axillary region. 12mm incision is made at ipsilateral axilla, subcutaneous plane is created with blunt dissection and operating space is maintain with insufflation of carbon dioxide al low pressure. Other ports are inserted through contralateral axilla and bilateral post auricular incision.

Other Techniques:

The Da Vinci robotic system was developed to overcome the difficulties, technical challenges and weak point of endoscopic surgery, surgical robots have been applied in number of disciplines. First report of robotic trans-axillary thyroidectomy was reported in 2009. Since then robotic thyroidectomy was performed world widely. Robotic thyroidectomy performed with Da Vinci robotic system using axillary approach and bilateral axillo breast approach has been described.

Experimental intra oral approach to thyroid through sublingual route has been performed in fresh human cadavers but further experiment and experience is required for the approach.

Selection of approach and patient satisfaction:

Based on published international studies various minimally invasive approaches have been described. In spite of number of endoscopic approaches there is no evidence to suggest that one specific approach is better than other. The choice of approach is determined by surgeon's experience and patient's preference.

Patient's satisfaction regarding postoperative pain, cosmetic outcome, hospital stay seems to be in favor of endoscopic or minimally invasive thyroid surgery compare to conventional open surgery. Unfortunately only some 15% of thyroid patient were suitable candidates for this type of surgery. Some other patients were dissatisfied because their expectation regarding no visible scar couldn't meet.

CONCLUSION

Since the first report of endoscopic parathyroid surgery in 1996, various endoscopic approaches have been described and none of them seem to be universally accepted either due to unproven superiority of one approach compare to other or due to direct result of technical difficulties. Each technique has its own benefits and weakness. The choice between different approaches is determined by surgeon own experience and patient's preference. Endoscopic thyroidectomy should only be performed on carefully selected patients as there are various indication and contraindications for endoscopic thyroidectomy. Patient's satisfaction towards cosmetic outcome, postoperative pain and hospital stay seem to be higher in comparison to conventional open thyroidectomy.

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