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Evolution in thyroid surgeries: A short review

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Abstract

Aim: To contemplate on the evolution of thyroid surgeries and assess its outcome, feasibility and preferred surgical technique in thyroid surgeries. Thyroid surgeries have continued to evolve since many years with Kocher's neck incision being the classical incision for all thyroid surgeries. Benign thyroid diseases have been more commonly treated surgically and approaches to such have evolved over years. Hence, they are approached in both functionally and aesthetically giving a superior outcome. These have led to many recent developments in different approaches for thyroid removal. Some of them are Kocher's incision, lateral incision, TORS, and upper skin crease incision.

Materials and Method: A short elucidation of surgical approaches on thyroid surgeries to the newer advents in thyroid surgery.

Conclusion: Each of these following incisions have their respective advantages and disadvantages for the same. Most incisions are case specific and are suited perfectly for each type of thyroid gland removal. Hence no incision is superior in terms of outcome and removal of thyroid gland. But when the aesthetics are concerned TOR's shows superior scar less surgery followed by high neck skin crease incision which hides the scar under shadow of mandible followed by other incisions respectively.

Keywords: Thyroid surgeries, TORS, surgical technique

Introduction

The perspective on thyroid surgeries over the years have shifted towards achieving functional and superior cosmetic outcomes. In the modern era achieving excellent cosmetic results post thyroidectomy has been deemed important. Hence emphasis on extra-cervical routes for thyroidectomy are preferred over classical neck approaches. The idea to achieve scar less thyroidectomy has gained popularity as thyroid surgeries have gained momentum over functional to cosmetic outcomes.

Many techniques and advances in thyroid surgical approaches have been greatly aimed at achieving both functional and aesthetic outcomes in thyroid surgeries. Approaches to thyroid surgeries have since been divided into extra-cervical and trans cervical approaches. They can also be classified into conventional, endoscopic and robotic thyroidectomy. Many factors to be considered apart from functional outcome in thyroid surgeries. These approaches are based on such factors like technical feasibility, safety, patient satisfaction and cost effectiveness^[1, 2].

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 and 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.

The classical incision in thyroid has been "Kocher's incision" eventually leading to a few modifications in this incision such as vertical midline "T" incision followed by lateral incision and superior skin crease incision and lastly the distant approaches like endoscopic anterior / breast approach, endoscopic axillary approach, endoscopic axillo-breast approach (hybrid), endoscopic post-aural approach, endoscopic transoral approach.

Incision is centered over the isthmus of the thyroid which lies just caudad to the cricoid cartilage. Initially incisions were made as vertical midline T incision of the skin extending down to manubrium sterni for mobilization of large mediastinal and thoracic inlet goitres.

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Discussion

The era of modern thyroid surgery was introduced by Theodore Billroth. In 1883 Theodore Kocher used the technique of capsular dissection and received a Noble prize in 1909 for minimal morbidity in thyroid surgeries. Many surgical techniques have been identified since then. Most concerns have been on aesthetics and access to thyroid gland. Thomas Dunhill described sternotomy for better access of intrathoracic goitres. Since the advent of robotics and endoscopic procedures have made distant access to thyroid feasible.

Outline of historical surgical incisions for thyroid gland.

Between 1873 and 1893 Billroth and Kocher standardized the dissection and excision of the thyroid gland during surgery. Since then many modifications have been done to make a smaller incision [3].

Kochers incision: a classical transverse collar skin incision of 2cms above the suprasternal notch from one sternocleidomastoid to another [3].

Advantages

1. Standardized technique.
2. Easy learning curve.
3. Excellent access to the surgical site.

Disadvantages

1. Poor cosmesis

Vertical "T" incision: a classical transverse incision is made and an additional vertical midline incision of the skin extending down to the manubrium sterni [4].

Advantages

1. Indicated for mobilization of large mediastinal goitres.
2. Thoracic inlet goitres.

Disadvantages

1. Scar contraction and decreased neck mobility.
2. Aesthetically unappealing.

Modified Kochers incision: a classical Kochers transverse incision is made and then extended laterally as a longitudinal incision along the anterior border of Sternocleidomastoid muscle [4].

Advantages

1. For large goitres.
2. In malignancy, where lateral neck dissection along with central compartment clearance.

First neck skin crease incision: a single transverse incision in the upper neck skin crease. The incision can be between 2.5 – 4cms in the size depending on the size and volume of thyroid gland to be removed [5].

Advantages

1. Scar is less prominent and hidden under the shadow of mandible.
2. Limited to only benign thyroid nodules.
3. Easy learning curve.
4. Superior cosmesis.

Disadvantages

1. Limited to only benign thyroid nodules.

2. Cannot be used for malignancies and larger goitre.

Minimal access thyroid surgery is the recent addition to the surgical techniques of thyroid surgeries. Minimal access surgery has been long established in many surgical specialties but in head and neck its popularity increased in thyroid and parathyroid surgeries. The quest for superior aesthetic outcome has made minimal invasive thyroid surgery more popular. Over the years many modifications of minimally access surgery have taken place which includes endoscopic techniques with or without gas insufflation, video assisted endoscopic technique and minimally invasive open surgery [6].

Endoscopic lateral approach

Originally this approach was first described by Henry in year 1999 [6, 7]. 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 requires three ports (one 10 mm and two 2.5 mm) which are inserted along the medial border of sternocleidomastoid muscle. Operating space was maintained with CO2 insufflation at low pressure of 8 mmHg. Since the incision is place on one side of neck, only unilateral pathology could be resected which was the main disadvantage of this approach. For exploration of contralateral side in the same setting further extension of incision (collar incision) was needed. But over the years the various endoscopic access routes were identified such as lateral neck, anterior chest, axilla and breast.

Disadvantage of endoscopic route includes the availability of instrumentation like 30 degree endoscopes, learning curve, and gas insufflation [7].

Minimally invasive video assisted thyroidectomy/Lateral mini approach

This technique was 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. 1.5cm incision is made in the cervical skin crease and through this incision the excised thyroid is delivered after video assisted dissection is done. This technique is easier to learn as compare to other endoscopic surgery and differs with conventional thyroid surgery in of length of the incision [6, 7].

Advantages

1. Small incision hence good cosmetic outcome.
2. Decreased tissue trauma.
3. Increased postoperative comfort.

Disadvantages

1. Longer surgical time.
2. Steep learning curve.
3. Limited for unilateral thyroid lobectomy

Extra cervical or Indirect Approaches

Anterior chest / Breast approach through infraclavicular incision. The main aim of this approach is to be "scarless" over the neck. Incision can be placed at upper circum-areolar or infraclavicular region and plane of dissection is sub platysmal. Operating space is maintained either by skin lifting device or carbon dioxide insufflation at low pressure. Thyroid gland is exposed by longitudinal division of strap muscle [6, 7].

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 avoids scar over the neck and offers good cosmetic outcome with less subcutaneous dissection required since the distance between incision and thyroid gland is short. 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). Incision is made in ipsilateral upper circum-areolar region. 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. Another modification is bilateral axillo-breast approach (BABA). This approach is valid for bilateral access. Post Auricular and Axillary Approach avoids peri-areolar region dissection and also maintain triangulation of manipulation at same time [7].

Advantages

1. Superior cosmesis with no visible scars.

Disadvantages

1. Dissection of contralateral side is difficult and collision of instrument is common due to limited operating space.
2. The technique is criticized for being maximally invasive as it involves extensive dissection of subcutaneous flap to create working space.
3. Young female patients are concerned to have their breast involved.
4. Subcutaneous emphysema around neck with CO2 inflation.
5. Longer operative time.

Conclusion

Thyroid surgery has been evolved over many years with various modifications in surgical approaches. A brief description of history to thyroid surgery reflects on various shifts in thyroid surgeries. With advent of newer techniques, it is possible to achieve both functional and superior aesthetic outcomes. Though every surgical technique has its own advantages and disadvantages, understanding and assessing the feasibility of each technique with its repercussions is important. In terms of malignancies the access and functional outcome should not be compromised over aesthetics hence conventional approaches are more suitable whereas, in benign nodules minimally invasive techniques like endoscopic and robotic surgeries are superior for cosmesis. Though to avoid patient expenses and in economical hospital setups the classical first neck crease incision can be opted for superior functional and aesthetic outcomes.

Ethical Clearance: Not required.

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