

OUTCOME OF CAPSULAR DISSECTION USING MONOPOLAR CAUTERY IN THYROIDECTOMY- A RETROSPECTIVE STUDY

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ABSTRACT

BACKGROUND

The main post-operative complications of thyroidectomy are temporary hypocalcaemia (20%), permanent hypocalcaemia (4%), transient vocal cord palsy (1-2%) and permanent vocal cord palsy (0.5-1%). These complications are less with experienced surgeons using capsular dissection technique. The technique of capsular dissection can be done with the conventional technique or using other energy sources. Our study aims to find the outcome of capsular dissection using monopolar cautery. We wanted to study the outcome of capsular dissection technique, using monopolar cautery, during thyroid surgery, with regard to complications, bleeding and time taken for the procedure.

METHODS

This is a retrospective study conducted in the Department of Surgery, Government Medical College, Thrissur. Details of patients undergoing thyroidectomy by capsular dissection technique, using monopolar cautery, during the period 2012 to 2015 were collected. Collected data was subjected to statistical analysis with the help of SPSS Ver. 21.0. Basic statistical methods like percentage analysis is used for analysis of data.

RESULTS

115 patients who underwent thyroidectomy for varying indications during the period and satisfying the inclusion criteria were included in the study. All patients were operated under general anaesthesia. All surgeries were done by the same surgeon, by capsular dissection technique using monopolar cautery. Average time duration was 79 minutes for total and 60 minutes for hemi-thyroidectomy. Blood loss was less than 30 ml. in all patients. There was no mortality. Overall complication rate was 5.2%. Transient hypocalcaemia was 3.4%, temporary hoarseness was 2.2% and wound haematoma was 0.8%.

CONCLUSIONS

Capsular dissection using monopolar cautery in thyroidectomy is safe and effective. This technique is less time consuming, causes only minimal bleeding and has lower complication rate.

KEYWORDS

Capsular Dissection, Thyroidectomy, Monopolar Cautery Dissection.

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BACKGROUND

Thyroidectomy is a common surgical procedure performed for a variety of thyroid diseases. It may be removal of one lobe or total removal of the gland as in cases of malignancy of thyroid. In Early years thyroid surgery was notorious for its complications and mortality. The high mortality was mainly due to haemorrhage, asphyxia due to tracheal compression and air embolism. Surgeons like Theodor Billroth and his pupil Theodor Kocher gave this procedure a new lease of life. Over years the technique of thyroidectomy improved, morbidity and mortality very much reduced. The

main complications of thyroidectomy are hypocalcaemia and vocal cord palsy. These complications are less with experienced surgeon and capsular dissection technique. Capsular dissection sometimes referred to as Delbridge technique, involved dissection inside the pseudo capsule / pre tracheal fascia, hugging the gland and dividing the tertiary branches of the vessels, preserving the parathyroid glands with their vascular pedicles, with minimal exposure of the recurrent laryngeal nerve or disturbance of its blood supply. The conventional technique of capsular dissection includes dissection using haemostat, ligating the terminal branches of the vessels. Capsular dissection using bipolar cautery is described, with good postoperative results. Our study aims to find the outcome of capsular dissection using monopolar cautery, in terms of complications, duration of surgery and blood loss.

Aims and Objectives

To study the outcome of capsular dissection technique, using mono polar cautery, during thyroid surgery, with

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regard to complications, bleeding and time taken for the procedure.

METHODS

This is a retrospective study conducted in the department of surgery, govt. medical college Trissur. Details of patients undergoing thyroidectomy by capsular dissection technique using mono-polar cautery, by a single surgeon, during the period 2012 to 2015 collected. Surgery done for recurrent thyroid swellings, malignant thyroid swellings with extra capsular extension, patients with associated neck dissection and those patients with pre-operative hoarseness or hypocalcaemia symptoms are excluded from the study. Data collected included demographic data, results of laboratory investigations, diagnosis, type of thyroidectomy, time taken for thyroidectomy- from skin incision to skin closure, blood loss- number of gauzes soaked, number of units of blood transfusion, duration of hospital stay and post-operative complications. Complications noted include post-operative bleeding, hematoma, hypoparathyroidism, recurrent laryngeal nerve injury and any other complications. Hypocalcaemia is diagnosed by clinical symptoms and serum calcium levels less than 2.20 mmols/l or 8.8 mg/dl. Recurrent laryngeal nerve injury confirmed by hoarseness and laryngoscopy findings. Collected data were subjected to statistical analysis with the help of SPSS software version 21.0. Basic statistical methods like Percentage analysis is used for analysis of data.

RESULTS

There were a total 115 patients who underwent thyroidectomy for various indications during the period, satisfying the inclusion criteria. Various indications for thyroidectomy are shown in (table/ figure 1). Majority were benign goiters (96/115). There were 11 papillary carcinoma and 8 follicular neoplasms. All toxic goiters were euthyroid at the time of surgery, controlled with anti-thyroid drugs. There was 88 total thyroidectomy and 27 hemi thyroidectomies. All patients were operated under general anaesthesia. All the surgeries were done by the same surgeon, by capsular dissection technique using monopolar cautery.

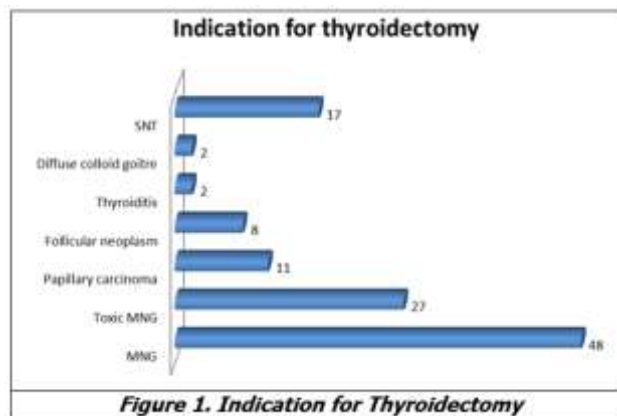
Age of patients ranged between 18 years and 76 years. Male female ratio 1:6.6. Time taken for total thyroidectomy ranged from 50 minutes to 2 hour 10 minutes. Time for hemi thyroidectomy ranged from 50 minutes to 1 hour 35 minutes (table/Fig. 2 & 3). Average time duration was 79 minutes for total and 60 minutes for hemi-thyroidectomy. Blood loss was less than 30 ml (2-3 soaked gauze pieces). None of the patients required transfusion.

There was no mortality. Overall complication rate was 5.2%. Complications included transient hypo calcaemia in 3 patients undergoing total thyroidectomy (3.4%) (95% CI 0.11-0.095), temporary hoarseness in 2 patients undergoing total thyroidectomy (2.2%) (95% CI 0.006-0.079) (table 4), and wound hematoma in one patient. Hypocalcaemia symptoms were mild, with perioral paraesthesia and numbness of hands and feet. None of them had tetany. Hypo

calcaemic symptoms were seen in the two patients with thyroiditis. They were treated with oral calcium and vitamin D3. Hypocalcaemia symptoms improved within one month in all the three patients. Those with hoarseness were treated with voice therapy and normal voice was regained within few weeks. One patient with hemi thyroidectomy had wound hematoma (0.8%). She had re exploration done on the second post-operative day and hematoma evacuated from the subcutaneous region.

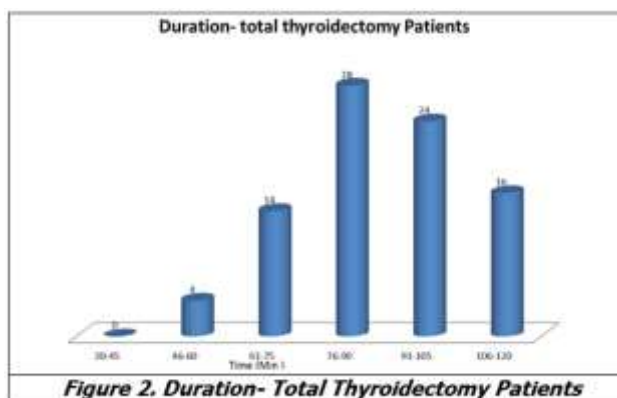
Diagnosis	Number
MNG	48
Toxic MNG	27
Papillary Carcinoma	11
Follicular Neoplasm	8
Thyroiditis	2
Diffuse Colloid Goitre	2
SNT	17
Total	115

Table 1. Indications for Thyroidectomy



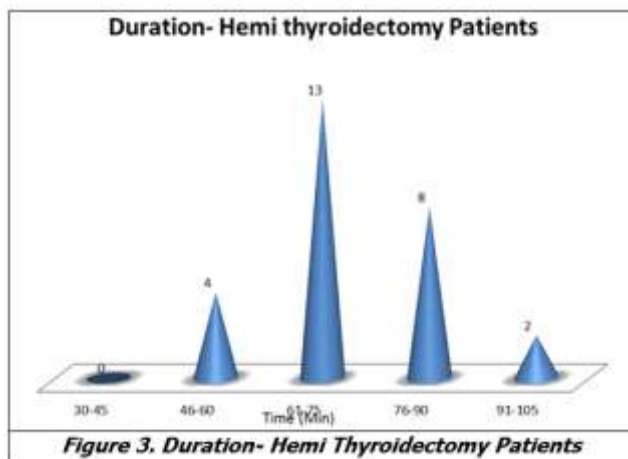
Time in Minutes	Number of Patients
30-45	0
46-60	4
61-75	14
76-90	28
91-105	24
106-120	16
121-135	2
136-150	0
151-165	0
166-175	0
Total	88

Table 2. Duration of Total Thyroidectomy



Time (min.)	Number of Patients
30-45	0
46-60	4
61-75	13
76-90	8
91-105	2
106-120	0
121-135	0
Total	27

Table 3. Duration of Hemi Thyroidectomy



Total Thyroidectomy (88)	Number of Patients	%
Transient Hypocalcaemia	3	3.40%
RLN Palsy- temporary	2	2.20%
Hemithyroidectomy (27)		
Hypocalcaemia	0	0.00%
RLN Palsy	0	0.00%

Table 4. Complications

DISCUSSION

Thyroid surgery was first performed in AD 952 by Albucais. Halsted in his 'The operative history of goiter' scrutinized procedures done before 1850 and analysed them to be associated with 40% mortality¹ Surgeons like Theodor Billroth and his pupil Theodor Kocher gave this procedure a new lease of life, between 1877 and 1881, Billroth performed 48 thyroidectomies and was able to decrease the mortality to 8.3. At the age of 76, in 1917, Kocher presented the results of his entire work at the Swiss Surgical Congress, about 500 thyroid surgeries performed by him with a mortality rate of 0.5%.² Over the years the technique and results of thyroidectomy improved. Today thyroidectomy is a very common procedure, done for a variety of indications. All thyroid diseases are more common in females. In our series also, majority were females. Common indications were benign goiters.

At present, mortality for this procedure is approximately 0%, and the overall complication rate is less than 3%.³ Most common complications include vocal cord paresis or paralysis, hypoparathyroidism, hypocalcaemia, hematoma and wound infection.³ Tracheal injury is a very rare complication associated with thyroidectomy (less than 1%).^{4,5} Bilateral recurrent nerve paralysis resulting in adduction of the vocal cords is a rare life-threatening complication (occurring in less than 0.1%). Our results show

that, all complications are low in our series. There was no permanent recurrent laryngeal nerve injury or parathyroid deficiency. Temporary hoarseness due to recurrent laryngeal nerve injury was 2.2%. This is probably because of the avoidance of dissection around the nerve. This view may not be completely agreeable to many. Some studies point out that routine intraoperative dissection of the nerve reduced the rate of postoperative cord paralysis.⁶⁻¹¹ Others point out that, thyroid carcinoma, re-operation for recurrent goiter, non-identification of recurrent laryngeal nerve (RLN) during surgery and total thyroidectomy were associated with a significantly increased risk of operative recurrent laryngeal nerve injury.¹²

Postoperative hypocalcaemia is the most common complication observed after total thyroidectomy 1.6% to 50%.^{11,12} Permanent hypoparathyroidism varies between 0.4% and 33%.^{13,14} Rate of permanent and temporary parathyroid deficiency in our group of patients were 0 and 3.4% respectively. The rate is very much low compared to the rates in many series, including those with capsular dissection technique. Those with hypocalcaemia improved within one month and the symptoms disappeared, but these patients were kept on low dose calcium vitamin D3 supplementation for a few more months. Hypocalcaemia occurs after total thyroidectomy is due to injury of parathyroid glands and/or their blood supply or accidental removal of the glands. Risk factors are low level of intraoperative parathormone (PTH) and presence of parathyroid gland in the pathological specimen. The symptoms can be presented acutely after surgery or can occur later; if symptoms remain six months after surgery, the postoperative hypoparathyroidism is considered as permanent. The prevalence varies with the expertise and experience of the surgeon. Literature says, most patients with a low postoperative parathyroid function recover function quickly, but it can take up to 1 year for full resolution.¹⁵

We had a patient who developed hematoma which was re-explored, and hematoma evacuated. The incidence of bleeding after thyroid surgery is low (0.3-1%), but an unrecognized or rapidly expanding hematoma can cause airway compromise and asphyxiation. In an analysis of a large number of thyroidectomy (147, 344 thyroid and parathyroid operations), 1.5% experienced postoperative neck haematoma.¹⁶ Because of the possibly long interval between the initial operation and the hematoma development, ambulatory and one-day thyroid surgery is not advisable.¹⁷

There was no Tracheal injury in our group of patients. Tracheal injury is very rare during conventional thyroidectomy. Gosnell et al.⁵ identified an incidence of perforation of 0.06%. The trachea may be perforated at the time of surgery or may undergo necrosis in the early postoperative period. Acute perforations tend to occur in the region of the ligament of Berry.¹⁸ Risk factors associated with the tracheal injury occurring during or after thyroidectomy are female gender, benign thyroid diseases, prolonged intubation with high cuff pressure, toxic goiter,

excessive use of cautery with increased blood loss intra-operatively, wound infection, tracheomalacia, and postoperative vigorous cough.¹⁹

Capsular dissection technique, the technique of separating the diseased gland from the surrounding pseudo-capsule (pre-tracheal fascia), by dissecting along the surface of the true capsule of the thyroid, will avoid important structures and will prevent complications. In this technique nerve is not exposed or traced. Many studies which tried tracing and exposing nerves has shown increased nerve injury as well as transient and permanent hypoparathyroidism.²⁰ Meticulous capsular dissection is superior to dissection of the entire nerve in avoiding transient nerve damage as well as temporary hypocalcaemia.²¹ Delbridge et al., published their experience of 825 cases with total thyroidectomy using similar technique with permanent hypoparathyroidism in 0.6% and permanent RLN palsy in 0.5% cases.²² Some authors point out that intracapsular thyroidectomy is an effective and safe technique for total thyroidectomy for young surgeons.²³ The technique of capsular dissection can be done with the conventional technique of dissection using haemostat, ligating the terminal branches of the vessels. Capsular dissection using bipolar cautery is described, with good postoperative results. One study published from India recommends the use of bipolar electro cautery for thyroidectomy. They claim very low incidence of recurrent laryngeal nerve injury and parathyroid injury (temporary vocal cord palsy, 0.77% and permanent vocal cord palsy 1.5%, Temporary hypocalcaemia 28.5%, Permanent hypocalcaemia 2.3%.²⁴ Bipolar electro surgery uses lower voltages, so less energy is required; it is more ideally used for those procedures where tissues can be easily grabbed on both sides by the forceps electrode. Electro surgical current in the patient is restricted to just the tissue between the arms of the forceps electrode. The use of bipolar diathermy with standard forceps for vessel ligation in thyroid surgery has been shown to be as safe and effective as the clamp-and-tie technique, while resulting in earlier patient discharge.²⁵ Both bipolar vessel sealer and harmonic scalpel had comparable results.²⁶ Manouras et al., found that, compared with the classic technique, surgical time was reduced significantly by about 20% when the bipolar /vessel sealer was used.²⁶

Monopolar electro surgery can be used for several modalities including cut, blend, desiccation, and fulguration. Using a pencil instrument the active electrode is placed in the entry site and can be used to cut tissue and coagulate bleeding. The return electrode pad is attached to the patient. Monopolar electro surgery is the most commonly used because of its versatility and effectiveness. Our study proves that monopolar cautery is safe and effective tool for doing total thyroidectomy by capsular dissection technique. But experience of the surgeon may be a factor which cannot be ignored.

CONCLUSIONS

Capsular dissection using monopolar cautery in thyroidectomy is safe and effective. This technique is less time consuming, causes only minimal bleeding and has lower complication rate.

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