

Study of Complications of Thyroidectomy with Special Reference to Recurrent Laryngeal Nerve Injury.

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ABSTRACT

Background: Thyroidectomy is one of the most commonly performed procedure for thyroid disorders. The mortality and morbidity of thyroidectomy was very high. Sterile surgical arenas, advent of anaesthesia, and improved surgical techniques have reduced it considerably. Patients must be appropriately counseled in the preoperative period regarding the potential complications. They must be well aware of the surgical risks they are to undertake. A thorough understanding of anatomy and with experience, the surgeon can minimise the risk associated with the procedure. **Aim:** Study the incidence of complications of thyroidectomy with special reference to recurrent laryngeal nerve injury. **Methods:** This is a hospital based prospective study, from 2008 to 2015.823 cases who underwent thyroidectomy for any indications at a tertiary care institution at north Malabar .Data collection: A detailed clinical evaluation was done. Intra operative documentation of surgical details was done. Post operatively the patients were monitored for any complications. Follow up serum TSH was monitored in second post op week, and then every month till six months. **Results:** The overall incidence of complications is 35.76%. Commonest complication is transient hypoparathyroidism(21.87%), followed by transient RLN injury (3.4%), permanent hypoparathyroidism (3.2%), flap edema (2.3%), EBSLN injury (2.06%), hematoma (1.45%), hypothyroidism (0.97%) and wound infection (0.73%). **Conclusion:** Meticulous dissection, absolute hemostasis, and a thorough knowledge of neck anatomy are the key in reducing the post thyroidectomy complications. Identification and preservation of the laryngeal nerves and parathyroids are mandatory. Incidences of other complications are on the decline.

Keywords: Flap edema, Hypoparathyroidism, Hypothyroidism, Laryngeal nerve injury, Thyroidectomy complications.

INTRODUCTION

Thyroidectomy is one of the most commonly performed procedures for both benign and malignant diseases of the thyroid.^[1] The first credible account of thyroid surgery was given in 1170 by Roger Frugardi Salerno in the Bamberg manuscripts^[2]. The mortality of thyroid surgery in early 1800s was approximately 50%.^[3]

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Sterile surgical arenas, advent of anaesthesia, and improved surgical techniques have reduced the mortality by a large scale. Theodor Kocher, Theodor Billroth, William Halsted are a few pioneers associated with the renaissance of thyroid surgery.^[4] The possible early complications of thyroidectomy are haemorrhage, recurrent laryngeal nerve (RLN) and external branch of superior laryngeal nerve (EBSLN) injuries, hypoparathyroidism (HPT),

wound infection, seroma and thyroid crisis whereas the late one is thyroid insufficiency.^[5] While the complications of thyroid surgery has certainly decreased, surgeons must nevertheless maintain a healthy respect for possibility of such a complication. Patients must be appropriately counselled in the preoperative period regarding the potential complications. They must be well aware of the surgical risks they are to undertake. By developing a thorough understanding of anatomy and the methods to prevent each complication, the surgeon can minimise the risk associated with the procedure.^[6] Experience of the surgeon is a significant factor in minimising or dealing with the complications. As stated by William Halsted the extirpation of the thyroid gland... typifies, "perhaps better than any operation, the supreme triumph of the surgeons art".^[7]

Aim

Study the incidence complications of thyroidectomy with special reference to recurrent laryngeal nerve injury.

MATERIALS AND METHODS

This is a hospital based prospective study, from 2008 to 2015.

823 cases who underwent thyroidectomy for any indications in general surgery department of a tertiary care center were included.

Data collection: A detailed history was taken and a physical examination was done for all patients apart from the routine investigations like thyroid function tests (TFT), indirect laryngoscopy(IL), serum calcium. Intra operative documentation of duration of surgery, bleeding, identification and safeguarding of recurrent laryngeal nerve (RLN) by the inferior approach was done. External branch of superior laryngeal nerves (EBSLN) and parathyroids (PT) were identified and preserved. Post operatively the patients were monitored for any complications like oozing, neck swelling, stridor, hoarseness of voice, features of hypoparathyroidism and wound infection. Apart from routine post operative investigations, serum calcium was checked routinely 24 hour after surgery and corrected for serum albumin levels. A fall in corrected serum calcium concentration below 8 mg/dL, and / or the need for calcium supplementation was defined as temporary hypoparathyroidism. The need for oral vitamin D and / or calcium supplements six months following surgery to maintain a normal serum calcium concentration was branded as permanent hypoparathyroidism.

Post operative IL was done for patients with hoarseness of voice on the 5th postoperative day. A temporary palsy was one which recovered within six months. Permanent RLN injury was defined as vocal cord palsy, diagnosed by either indirect laryngoscopy or videolaryngostroboscopy, which lasted for more than six months post operatively. Follow up serum TSH was monitored in second post op week, and then every month till six months.

RESULTS

823 cases were analysed during the study period out of which 174 developed complications. There was no intra or post operative mortality in this study. 127 patients had a single complication, 30 developed two and 17 developed three complications. Total number of complications in this study was 297.

Table 1: Over all complications.

| Complications | Number | % |
|------------------------------|--------|------|
| RLN injury transient | 28 | 3.4 |
| RLN injury permanent | 03 | 0.4 |
| RLN unidentified | 08 | 1.0 |
| EBSLN injury | 17 | 2.1 |
| Flap edema | 19 | 2.3 |
| Wound hematoma | 12 | 1.5 |
| Transient hypoparathyroidism | 180 | 21.9 |
| Permanent | 27 | |

| | | |
|--------------------|-----|-----|
| hypoparathyroidism | | 3.2 |
| Wound infection | 6 | 0.7 |
| Hypothyroidism | 08 | 1.0 |
| Total | 297 | 36 |

Table 2: Gender distribution.

| | |
|--|-----|
| Total number of patients | 823 |
| Number of male patients | 289 |
| Number of female patients | 534 |
| Number of male patients with complications | 026 |
| Number of female patients with complications | 055 |

Table 3: Complications in male patients.

| Complications | Number | % |
|------------------------------|--------|-------|
| RLN injury | 11 | 3.8 |
| EBSLN injury | 09 | 3.1 |
| Flap edema | 09 | 3.1 |
| Wound hematoma | 05 | 1.7 |
| Permanent hypoparathyroidism | 17 | 5.9 |
| Transient hypoparathyroidism | 46 | 15.9 |
| Wound infection | 03 | 1.03 |
| Hypothyroidism | 05 | 1.7 |
| Total | 105 | 36.23 |

Table 4: Complications in female patients.

| Complications | Number | % |
|------------------------------|--------|-------|
| RLN injury | 17 | 3.18 |
| EBSLN injury | 08 | 1.49 |
| Flap edema | 10 | 1.87 |
| Wound hematoma | 07 | 1.3 |
| Permanent hypoparathyroidism | 10 | 1.87 |
| Transient hypoparathyroidism | 134 | 25.1 |
| Wound infection | 03 | 0.56 |
| Hypothyroidism | 03 | 0.56 |
| Total | 192 | 35.93 |

Complications based on surgical procedures.

All 51 hemi thyroidectomy were uneventful 299 subtotal thyroidectomy(STT), were performed of which 20 patients developed complications. Two patients had unilateral RLN palsy.

Table 5: Complications after Subtotal thyroidectomy.

| Complications | Number | % |
|------------------------------|--------|-------|
| RLN injury | 02 | 0.67 |
| EBSLN injury | 01 | 0.33 |
| Flap edema | 06 | 02 |
| Wound hematoma | 05 | 1.67 |
| Permanent hypoparathyroidism | 02 | 0.67 |
| Transient hypoparathyroidism | 10 | 3.34 |
| Wound infection | 01 | 0.33 |
| Hypothyroidism | 04 | 1.4 |
| Total | 22 | 10.41 |

Near total thyroidectomy: 182 near total thyroidectomy was performed out of which 34 developed complications. Three persons developed left recurrent laryngeal nerve injury which was transient.

Table 6: Complications after near total thyroidectomy.

| Complications | Number | % |
|------------------------------|--------|-------|
| RLN injury | 03 | 1.64 |
| EBSLN injury | 00 | 00 |
| Flap edema | 02 | 1.09 |
| Wound hematoma | 07 | 3.85 |
| Permanent hypoparathyroidism | 05 | 2.75 |
| Transient hypoparathyroidism | 07 | 3.85 |
| Wound infection | 01 | 0.55 |
| Hypothyroidism | 07 | 3.85 |
| Total | 11 | 17.58 |

Total thyroidectomy.

290 total thyroidectomy were performed out of which 26 patients developed complications. One patient developed RLN injury, 38 patients underwent modified radical neck dissection of which 10 developed flap edema and necrosis. Five patients had hypoparathyroidism.

Table 7: Complications after total thyroidectomy.

| Complications | Number | % |
|------------------------------|--------|-------|
| RLN injury | 07 | 2.41 |
| EBSLN injury | 02 | 0.69 |
| Flap edema | 10 | 3.45 |
| Wound hematoma | 06 | 2.06 |
| Permanent hypoparathyroidism | 11 | 3.8 |
| Transient hypoparathyroidism | 26 | 09 |
| Wound infection | 01 | 0.34 |
| Hypothyroidism | 15 | 5.17 |
| Flap necrosis | 07 | 2.41 |
| Total | 53 | 29.33 |

DISCUSSION

The three main complications after a thyroidectomy are hypoparathyroidism, RLN injury and bleeding.^[8] The overall incidence of complications is 35.76%. Commonest complication is transient hypoparathyroidism (21.87%), followed by transient RLN injury (3.4%), permanent hypoparathyroidism (3.2%), flap edema (2.3%), EBSLN injury (2.06%), and hematoma (1.45%), hypothyroidism (0.97%) and wound infection (0.73%). Complication rates were more commonly seen in males compared to females in our study, contrary to the usual. All the hemithyroidectomy procedures didn't have any complications. Today every surgeon gives importance to identification and preservation of RLN. We used the inferior approach for the same. Usage of cold scalpel is preferred during its dissection to avoid thermal injury to the nerve. In our series 3.4% patient had transient RLN injury whereas the permanent vocal cord palsy occurred only in 0.4%. We could not identify the RLN in 1% of cases. The anaesthetist assessed the vocal cord mobility in the immediate post operative period after extubation. In suspected cases of vocal cord mobility, intravenous steroids we started immediately to reduce the glottic edema.^[9] Tracheostomies were needed in two cases of thyroid malignancy in our study due to permanent

vocal cord palsy. The only way to avoid RLN injury is its deliberate identification in the neck. There are various landmarks like ITA, TZ, inferior or superior approaches for it. Usage of thermal devices for nerve dissection increases the chance for injuring it. The treatment of unilateral vocal cord palsy should not be undertaken until a waiting period of six months, because a transient palsy improves by that time. In a case of definite transection, treatment should be soon imparted. Medialization and reinnervation are the two available options for it. Medialization is commonly performed by with gel form injection or silastic or type 1 thyroplasty. This can be done early if patient is aspirating. Reinnervation procedures have been described using ansa cervicalis, preganglionic sympathetic fibres. Medialisation should be considered for older patients whereas reinnervation procedures should be attempted in younger patients.^[10,11] In case of bilateral vocal cord palsy, initial treatment is securing adequate airway. Endotracheal intubation may be the first option. When the integrity of both RLN are sure, trial extubation can be attempted. Intravenous steroids may be beneficial in this situation. If RLN function cannot recover after a second extubation, tracheostomy is warranted. Cordotomy and arytenoidectomy are procedures which will widen the airway and may permit tracheostomy decanulation. The patient has to be counselled regarding worsening of voice postoperatively. Neuromuscular pedicle transfer has been reported to improve the airway in cases of bilateral vocal cord palsy. The overall incidence of transient and permanent hypoparathyroidism was 7.3% and 1.5%, respectively in a study by Thomusch O et al^[12]. Gonçalves Filho J. demonstrated that there was transient hypocalcemia in 27.5%, permanent hypocalcemia in 5.1%.^[13] The identification and preservation of all parathyroids were attempted especially the constant superior ones. Meticulous dissection and absolute haemostasis are the keys in this crucial step. Special care is taken to preserve the branches to the parathyroids and ligate only the capsular branches of the inferior thyroid artery (ITA)^[14]. Complications were present in 21%, corresponding to 29 hypoparathyroidisms, 26 recurrent laryngeal nerve injuries, 4 superior laryngeal nerve injuries, 3 cervical hematomas, and 1 wound infection. Ozbas S et al in his study showed that after subtotal thyroidectomy 8.2% developed transient hypocalcaemia and 2.4% and 0.6% patients developed transient and permanent RLN palsy respectively. In NTT group 12.2% developed transient hypocalcaemia and 0.6% had transient voice disturbances. None of the patients experienced permanent complications. In total thyroidectomy group, 30% had transient hypocalcaemia whereas only 0.4% suffered permanent hypoparathyroidism^[15]. According to Lee YS et al the most common surgical complication was symptomatic

hypoparathyroidism, of which 28.4% of cases were transient and 0.3% permanent^[16]. Efremidou EI et al had permanent hypocalcemia in 0.3% and temporary hypocalcemia occurred in 7.3% of patients^[17]. In our study the incidence of transient and permanent hypoparathyroidism was 21.87% and 3.25 respectively. Identification and preservation of external branch of superior laryngeal nerve (EBSLN) is a standard step during thyroidectomy^[18]. The nerve is always at risk, and morbidity associated with it is very high. In spite of all these, EBSLN is not routinely identified and preserved during thyroidectomy. It is the only motor innervation of the CTM that serves as the tensor of the vocal cord^[19]. Unilateral EBSLN injury may result in mild voice huskiness, it is the bilateral injury which is more devastating. Temporary or permanent paralysis of CTM results in deterioration of quality of one's voice and or weakness, huskiness, decreased pitch, voice fatigue, inability to produce certain sounds^[20]. The type 2b EBSLN as described by Cernea et al is more injury prone, whereas type 1 is the least^[21]. In our series the rate of EBSLN injury is 2.1%. Lufti Soylu et al, in their series has shown that Eighteen (37.5%) patients complained of subjective voice changes in the early postoperative period and 7 (14.6%) of these were still uncomfortable after 3 months^[22]. The incidence of flap edema in our series was 2.3%. The explanation for a low incidence may be due to the fact that we use only the cut mode or cold scalpel. Celik AS et al and Uludag M et al has shown that surgeries done by residents resulted in high incidence of flap edema and there is no significant difference in raising the skin flap with electrocautery and knife^[23,24]. The rates of wound infection and hypothyroidism was to a tune of 0.73% and 0.975 respectively in our study. Rosato L et al and Menegaux F et al has demonstrated that wound infection rate was only less than 0.5%.^[25,26]

CONCLUSION

Meticulous dissection, absolute hemostasis, and a thorough knowledge of neck anatomy are the key in reducing the post thyroidectomy complications. During each thyroidectomy, RLN, EBSLN, and Parathyroids should be routinely preserved. For the identification and preservation of the RLN, inferior approach, tubercle of Zuckercandl, superior and lateral approaches, palpatory method may be used. The nerve not identified is most likely to be damaged leading to high morbidity and rarely mortality. Transient or permanent hypo parathyroidism is due to inadvertent gland removal or injury to its vascular pedicle. Dissection close to the thyroid capsule and ligation of capsular branches of thyroid avoiding the main trunk of inferior thyroid artery holds the key. Incidence of EBSLN injury, flap edema, wound infection and hypo parathyroidism are on the lower side.

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