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POST-OPERATIVE MORBIDITY: COMPARISON OF PRIMARY SURGERY VERSUS RE-OPERATIONS IN THYROID - 10 YEAR RETROSPECTIVE STUDY IN A TERTIARY CARE TEACHING HOSPITAL IN RURAL SOUTH INDIA

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ABSTRACT

Pathologies of thyroid gland, requiring surgical correction are on the rise. The surgeries on thyroid gland can be varied ranging from total thyroidectomy to various types where the entire gland is not removed. There are many who follow the practice of a less than total thyroidectomy for benign pathologies and follicular neoplasms of thyroid. Literature has showed the incidence of occurrence of malignancies and goiter in thyroid remnant, necessitating the need for re-operation in patients with primary less than total thyroid surgery. We did a retrospective study to introspect on thyroid surgeries done in our hospital in the past 10 years to know the trend followed in our hospital and to know the effects of different types of thyroid surgeries and the morbidities faced by patients undergoing reoperations. This is a cross-sectional study by retrospective chart analysis of all thyroidectomy cases from the past 10 years in our institute. Institutional review board and ethics committee approval was obtained. Data was analysed using SPSS v.25. 1094 thyroid surgeries were performed in the last 10 years, of which 1033 were primary surgery, and 61 were re-operations. There was a statistically significant increase in the occurrence of transient recurrent nerve palsy and transient hypocalcaemia in re-operations when compared to primary thyroid surgery. All the other parameters except permanent hypocalcaemia had higher rate in re-operations, though not statistically significant. 26 out of the 61 re-operations were done as the post-operative biopsy of the primary surgery showed malignancy while 30 were done due to occurrence of goitre in thyroid remnant. 3 were due to the occurrence of malignancy in thyroid remnant and 2 due to tumour recurrence. These findings make us feel whether we should deal all surgical pathologies of thyroid gland with total thyroidectomy. We know that this is not the teaching, but looking at the rate of morbidity in re-operations and the incidence of malignancy being detected post-operatively and surgical pathology developing in remnant thyroid, we feel the need for total thyroidectomy. There is a scope to revisit and rethink the surgical management of thyroid pathologies based on multicentric analysis.

KEYWORDS: Thyroid, Thyroidectomy, Post-operative complications, Re-operations, Surgery.

INTRODUCTION

Thyroid surgery or any surgery for that matter is always a concern for all patients. Their concerns include fear of intraoperative and post-operative complications. The incidence of thyroid disorders, including thyroid malignancy, has increased rapidly, in recent years.[1] The choice of surgical treatment is still controversial. Surgeries on the thyroid gland can be total thyroidectomy (complete removal of the thyroid gland) or incomplete removal of the thyroid gland which goes by various names such as subtotal thyroidectomy, near-total thyroidectomy, hemithyroidectomy, lobectomy or isthmusectomy. The concerns of the patients and the ease of doing the surgery, many a time consented for thyroid surgery in the form of hemithyroidectomy or lobectomy or near-total or subtotal thyroidectomy in benign pathologies. The option of not having to take supplementation drugs post-surgery in selected cases also encourages the patients to opt for the incomplete removal without realising the possibility of resurgery if the remnant develops a pathology later. Literature has shown the incidence of occurrence of malignancies and goitre and the need for re-operation, post hemithyroidectomy.[2]

Primary thyroidectomy is associated with a low incidence of recurrent laryngeal nerve injury and permanent hypoparathyroidism when performed by an experienced surgeon.[3-5] While re-operation is uncommon in thyroid surgery,[6] some patients who have undergone a previous thyroid surgery for the benign or malignant disease have to undergo thyroid re-operation. In cases of malignant disease, the re-operative procedure may form part of a staged thyroidectomy or may be performed to treat local recurrence in the thyroid bed.[7] Following benign disease, further surgery may be indicated for recurrence of the primary pathology or symptoms suggestive of malignancy. Studies have documented a significantly higher morbidity rate in reoperations after subtotal resection for goitre compared with initial surgery.[8] This is due to the presence of scar tissue and distorted anatomy, which may result in a greater risk of injury to the recurrent laryngeal nerve and parathyroid glands.[9] Post-operative complications include developing hypocalcaemia, recurrent laryngeal nerve palsy, haemorrhage, laryngeal oedema, tracheomalacia, pneumothorax.[10]

Though subtotal thyroidectomy was the treatment of choice for benign multinodular goitre, ever since the safety of total thyroidectomy has been established, its importance has decreased.[11] This is also because of the increased chance of having a recurrence, eventually needing re-operation. There can be recurrent disease following the initial surgery.[12]

Re-operations in the thyroid is a rare procedure. Various studies have reported incidence of 4.7% - 7.5%.[13] In a study conducted by Tun m et al. in a hospital in Malaysia, it was found that presence of carcinoma in the histopathology report of the specimen following a surgery less than total thyroidectomy in spite of negative fine-needle aspiration cytology (FNAC) report for malignancy as the most common cause for re-operation.[14] Benkhadoura m et al. in their study in two university hospitals in Libya reported that the most common indication for re-operation was the finding of malignancy in thyroid lobectomy specimen (n=35, 48%) followed by recurrent multinodular goitre (n= 27, 37%) recurrent uninodular goitre (n = nine, 12.3%) and recurrent thyrotoxicosis (n = two, 2.7%).[15]

Re-operative thyroid surgery is considered to produce more post-operative morbidities than primary surgery.[11,14-16] The main post-operative complications are hypocalcaemia and recurrent laryngeal nerve injury.[14,15] These can be transient or permanent. Transient hypocalcaemia is when the hypocalcaemia is corrected within six months and permanent if the hypo calcaemic period extends for more than six months.[13,14] Recurrent laryngeal nerve injury is also considered to be transient if it is corrected within six months and permanent if it extends more than six months.[11,14] Recurrent laryngeal involvement could be present pre-operatively as well due to the pressure effect of the thyroid pathology per se. This may get automatically corrected post-operatively as reported by Paul V et al. in a case in our centre.[17]

Comparing the morbidity in primary and re-operative surgery, Kurmann et al. Reported 1.2% cases with hypoparathyroidism in re-operative surgery while it was only 0.7% in primary surgery.[16] Calo et al. reported high rates of 38.7% of patients who developed transient hypoparathyroidism after re-operative surgery.[18] Gulcelik et al., Peix et al. and Rudolph et al. respectively reported transient hypocalcaemia in 20.7%,[19] 14.9%[20] and 11.3%[11] cases of re-operative surgery. However, Muller et al., Levin et al. and Terris et al. reported lower rates of transient hypocalcaemia respectively as 3%,[8] 3.4%[21] and 4.5%.[22]

Calo et al., Gulcelik et al. and Erdem et al. Studied the incidence of permanent hypocalcaemia and reported a positive incidence in 6.6%,[18] 4.4%[19] and 4.2%[23] cases respectively. A lower rate of development of permanent hypocalcaemia in 1.7% of patients who underwent re-operative thyroid surgery was reported by Chao et al.[6] Muller et al. reported a negligible rate of 0.5% of cases getting permanent hypocalcaemia after re-operative thyroid surgery.[8] Tun et al., Benkhadoura et al., Peix et al., Terris et al. and Wilson et al. reported that none of their patients developed permanent hypocalcaemia after re-operative thyroid surgery.[14,15,20,22,24]

Gulcelik et al. reported a high incidence of 9.4% of cases developing transient recurrent laryngeal nerve injury after re-operative thyroid surgery.[19] Benkhadoura et al., Rudolph et al. and Erdem et al. reported that 6.8%,[15] 5.9%[11] and 5.6%[23] of cases presented with transient recurrent laryngeal injury post re-operative thyroid surgery. Terris et al.[22] and Tun et al.[14] reported that there were no cases having transient recurrent laryngeal nerve injury after re-operation.

Muller et al. reported a fivefold increase in the incidence of permanent recurrent laryngeal nerve injury in re-operations when compared to primary thyroid surgeries.[9] Tun et al., Erdem et al. and Wilson et al. reported high rates of 4%,[14] 3.5%[24] and 3.1%[25] permanent recurrent laryngeal injury post re-operations whereas Rudolph et al., Hardman et al., Chao et al., reported lower rates of 2%,[11] 1.8%,[7] 1.7%[6] respectively.

These studies conducted in various parts of the world have shown an increased occurrence of morbidities following re-operations. Having to undergo a second surgery itself is a difficulty for any patient, and the added risk of complications after reoperation put forwards the need for asking whether taking up total thyroidectomy as the preferred choice in primary surgery should be considered.

There has not been a similar study done in a similar setting like ours. We carried out a retrospective study to introspect on thyroid surgeries done in our hospital in the past 10 years to know the trend followed in our hospital and to know the effects of partial surgeries and the morbidities faced by patients undergoing reoperations. We studied the rates of occurrence of morbidities following primary and re-operative thyroid surgery and compared them. Through this, we intend to improve our surgical methods and hospital policy with adequate corrective measures.

MATERIALS AND METHODS

This was a retrospective study by chart analysis of all thyroidectomy cases performed at the Department of General Surgery, MOSC Medical College, Kolenchery, Ernakulam, Kerala, India in the 10 years from 2007 to 2017. The sample size was calculated to be 1383 from a similar study by Khan M et al.[25] As the total number of patients who underwent thyroidectomy in our hospital during the study period was only 1094, we studied 1094 thyroidectomy cases. All patients who underwent thyroidectomy surgery in the last 10 years.

Post-operative morbidities looked for in the study included recurrent laryngeal nerve injury, hypocalcaemia, post-operative reintubation, post-operative tracheostomy, post-operative chest complication, post-operative haematoma, post-operative haematoma evacuation. Any injury to the recurrent laryngeal nerve which doesn't get corrected within six months is considered a permanent injury to the recurrent laryngeal nerve, and those which are rectified within 6 months as transient recurrent laryngeal nerve injury. Any state of hypocalcaemia which extends beyond a period of six months is considered permanent hypocalcaemia, whereas which gets corrected within six months is considered transient hypocalcaemia. Institutional review board and ethics committee approval was obtained, and permission was sought from the medical superintendent to conduct the study. As the investigator did not come in contact with the patient and the study involved only review of hospital records, we had requested a waiver of consent from the institutional ethics committee. All data were stored anonymously and was handled only by the investigator and authorised personnel. The data collected were tabulated in Microsoft Excel sheet for analysis. We performed Fischer exact test and chi-square test to know if there is any significant difference in the proportion of morbidities between primary surgery and re-operations in the thyroid. Statistical analysis was performed using IBM SPSS V25 software.

RESULT

We studied all the 1094 thyroidectomy cases that were done in our tertiary care teaching hospital in the 10-year period from 2007 to 2017. 61 (5.57%) were re-operations and the remaining were primary surgeries as can be seen in Table 1.

Table 1: Type of surgery.

Primary thyroidectomy	1033 (94.43%)
Re-operation	61 (5.57%)

Comparing the post-operative morbidities in re-operation versus primary surgery, there was a statistically significant difference between the groups in terms of transient recurrent laryngeal nerve injury (p=0.0043), transient hypocalcaemia (p=0.023). There was a higher proportion of morbidities in re-operations in all the outcomes considered except for permanent hypocalcaemia, but only transient recurrent laryngeal nerve injury and transient hypocalcaemia were statistically significant (Tables 2, 3).

Table 2: Comparison of Proportion of Post-Operative Morbidity.

Post-operative morbidity	Primary	Re-operation
Transient hypocalcaemia	24.6%	37.5%
Transient RLN injury	0.87%	6.5%
Permanent hypocalcaemia	1.74%	1.64%
Permanent RLN injury	0.19%	1.64%
Post-op reintubation	0.58%	1.64%
Post-op tracheostomy	0.38%	1.64%
Post-op chest complication	0.96%	1.64%
Post-op hematoma	0.67%	1.64%
Post-op hematoma evacuation	0.58%	1.64%

Table 3: Post-Operative Morbidity That Were Statistically Significant.

Post-operative morbidity	Odds ratio	P value
Transient hypocalcemia	1.856	0.023
Transient recurrent laryngeal nerve injury	7.984	0.0043

Indication for re-operative thyroid surgery in 26 out of 61 patients was because the post-operative biopsy of the primary surgery showed malignancy in the incompletely removed thyroid gland. 30 of 61 patients underwent re-operative surgery because of goitre in the thyroid remnant. Two were done due to tumour recurrence in the thyroid that had undergone an incomplete thyroidectomy. Three were done due to the presence of malignancy in the thyroid remnant (Figure 1).

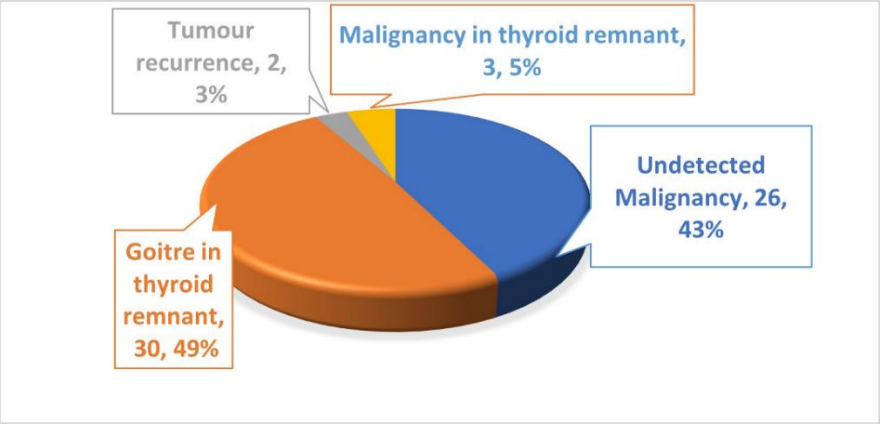

Figure 1: Indication for re-operation.

854 of the primary surgeries done were total thyroidectomies, while the remaining 179 were incomplete surgeries (Table 4).

Table 4: Type of surgery in primary thyroidectomy.

Type of surgery	Number of cases	%
Total thyroidectomy	854	82.67%
Hemithyroidectomy	85	8.22%
Near total thyroidectomy	61	5.90%
Subtotal thyroidectomy	32	3.10%
Isthmusectomy	1	0.01%
Total	1033	

On comparing the pre-operative cytology report with the post-operative histopathology report of the 1033 primary thyroid surgeries, out of the 898 cases that were reported as benign in the pre-operative FNAC, only 820 were actually benign and the remaining 78 (9%) were found to be malignant in the post-operative biopsy as can be seen in Figure 2. Pre-operative cytology showed 102 cases as follicular neoplasms of which the majority (59%) were found to be malignant on post-operative biopsy (Figure 2).

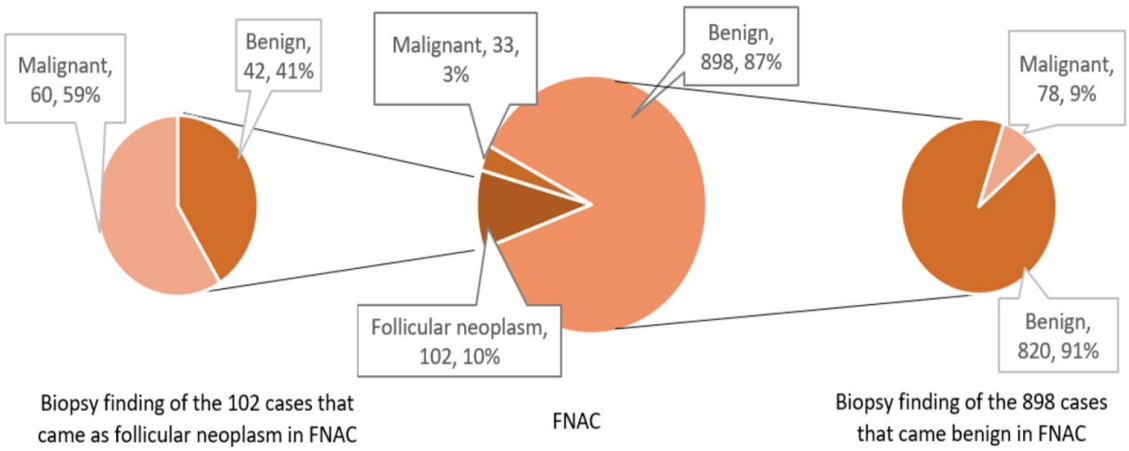

Figure 2: Comparison of pre-operative FNAC with post-operative biopsy.

171 in the 1033 primary surgeries came out to be malignant in the post-operative biopsy, of which only 19% were reported as malignant in the pre-operative FNAC. Among the remaining cases, 46% were reported

as benign and 35% as follicular neoplasm in the pre-operative FNAC (Figure 3).

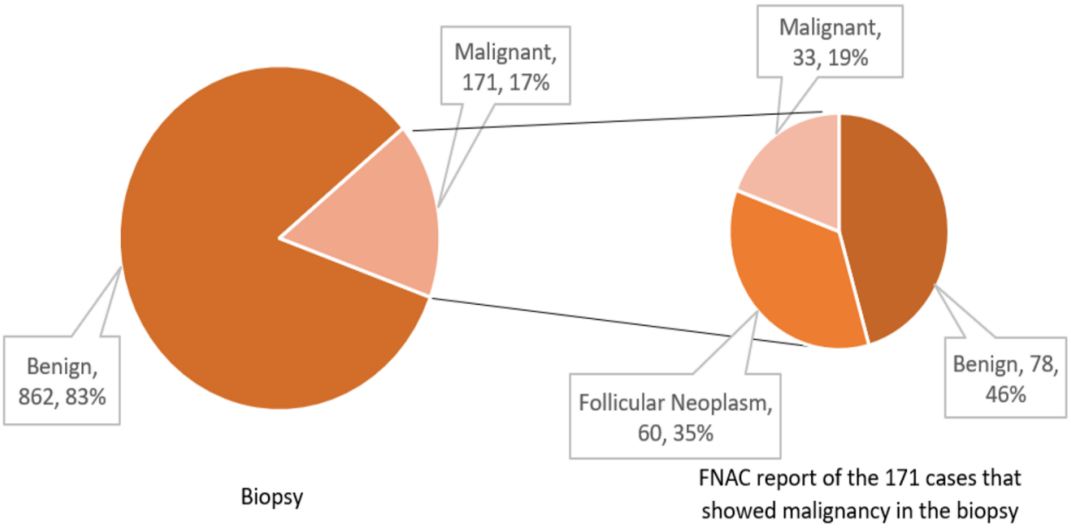

Figure 3: Comparison of post-operative biopsy report with pre-operative FNAC.

DISCUSSION

There has always been a conflict of ideas regarding the type of surgery to be done to correct surgical pathologies of the thyroid. There have been advocates for a lesser operation, not involving the complete removal of the thyroid gland, because of the lesser chance of nerve injury and considering that the use of thyroid supplementation drugs post-surgery can be avoided. But studies have shown a subset of patients, requiring supplementary drugs following a sub-total thyroidectomy.[26] Studies have also shown the need for re-operation in cases following any surgery less than a total thyroidectomy either due to detection of a well-differentiated carcinoma in the biopsy or due to recurrent benign conditions. Re-operations are often considered to be associated with a higher rate of morbidity than primary surgery. We studied all the thyroid surgeries (1094) in the past 10 years in our tertiary care teaching hospital in rural South India and compared the incidence of morbidities in primary surgery versus re-operation.

Our study found that of the 1094 thyroid surgeries done in our institute in the 10 years study period between 2007 to 2017, 1033 were primary surgeries and the remaining 61 were re-operations.

We found out a statistically significant difference at $p<0.05$, in transient hypocalcaemia and transient recurrent laryngeal nerve injury while comparing its occurrence in primary surgery versus re-operation. 37.5% of the re-operative cases had transient hypocalcaemia while it was found in only 24.6% of the primary surgeries. This is similar to what is seen in available literature where the incidence of transient hypocalcaemia was between 0.5 - 50%.[27] Our observations differed from that of Khan et al., who reported an increased incidence of transient hypocalcaemia in re-operation which was not statistically significant.[25]

It was also seen that a statistically significant increase in the incidence of transient recurrent laryngeal nerve palsy was seen in re-operative surgeries when compared to primary thyroid surgeries. 6.5% of all re-operation cases had developed transient recurrent laryngeal nerve injury while only 0.87% developed in the group of patients who underwent primary surgery. This was similar to the rates seen in literature, where an average of 0.5-5% cases developed transient nerve injury.[28] Our observations were similar to that of Hardman et al. who reported a statistically significant increase in the rate of transient recurrent laryngeal nerve injury in re-operations, (5.5% vs 2.5%, $p = 0.044$).[7]

It was also observed that the occurrence of other post-operative morbidity is also more in re-operations compared to primary surgeries, though it didn't reach statistically significant levels. We believe that it may be due to the limited number of cases under study. On an overall note, our study was in accordance with current literature by reporting an increased incidence of post-operative complications in re-operative thyroid surgery as to its incidence post primary surgery.

Our study reported the occurrence of goitre in thyroid remnant as the most common indication for re-operation at 49% followed by undetected malignancy at 43%. This was in conflict with what was reported by Tun m et al.[14] and Benkhadoura m et al.[15] who reported the most frequent indication for re-operation was the presence of malignancy in the histopathology report of the primary surgery.

Among the primary surgeries, 854 were done as total thyroidectomies (82.67%) whereas the remaining 179 were done as incomplete surgeries. The incomplete surgeries done, comprised of 85 hemithyroidectomies, 61 near-total thyroidectomies, 32 subtotal thyroidectomy and one isthmusectomy.

Of the 1033 primary surgeries done in our hospital during the study period, 138 were detected as malignant only post-operatively. 78 cases that were detected as benign in the FNAC were actually malignant thyroids. Similarly, 60 cases reported as follicular neoplasm was found to be malignant in the biopsy. Though an argument about the possibility of Frozen section biopsy intraoperatively for diagnosing malignancy may arise, its limitation has been reported.[29] The lack of availability of such resources in most centres in a developing country such as ours should also be considered.

It has also been reported by Jose J et al. that total thyroidectomy is a relatively safe procedure in geriatric patients.[30]

These findings prompt us towards total thyroidectomy for all surgical pathologies of the thyroid. We know that this is not the teaching but looking at the rate of morbidity in re-operations and the incidence of malignancy being detected post-operatively and surgical pathology developing in remnant thyroid, we feel the need for total thyroidectomy. There is a scope to revisit and rethink the surgical management of thyroid pathologies based on multicentric analysis.

CONCLUSION

The need for continuous learning based on multicentric trials to revisit the practices in thyroid surgeries cannot be overemphasised. Surgical proficiency, competency and mentorship and proper communication would help the surgeon to lower his threshold towards total thyroidectomy for the seemingly benign follicular neoplasms and also benign multinodular goitre. This would go a long way in reducing the number of re-operative surgeries which in turn produces higher complication rates and also economic burden and loss of human hours and the untold miseries associated with the labels of malignancy to the patient.

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