

Original article:

A prospective study of microscopic thyroidectomy at tertiary care hospital

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Abstract:

Introduction: The first recorded thyroidectomy attributed to Abdul Kasan Abis in Baghdad in AD 500. The mortality rate from thyroid surgery by 1850 was 40%. Albert theodor Billroth (1828 - 1894), one of the most prominent surgeon of his time, reduced his thyroidectomy mortality rate from 40% to 8%.

Methodology: It was prospective comparative study with study group patients posted for thyroid surgeries like hemithyroidectomy, sub- total thyroidectomy and total thyroidectomy were included in the study. Total 40 patients were studied. Among that we did microscopic thyroidectomy in 15 patients and conventional thyroidectomy in 25 patients. In microscopic group we did only hemithyroidectomy in 15 patients. In conventional way we did hemithyroidectomy in 11 patients, subtotal thyroidectomy in 9 patients and total thyroidectomy in 5 patients.

Results: Time taken to perform microscopic surgery was significantly high than time taken to perform conventional surgery. In microscopic thyroid surgery group we have seen complications like hypocalcaemia and recurrent laryngeal palsy but they were of transient nature. where as in conventional thyroidectomy patients we observed right recurrent laryngeal palsy in 3 patients (12%) and it was permanent.

Conclusion: Microscopic thyroidectomy helps in superior illumination and magnification of the path of surgical process. Vital structures injury or complication rate is comparatively less in microscopic surgery. Also we can attach camera to microscope for recording and teaching purpose. However research with greater sample size is recommended for further evaluation.

Keywords: Microscopic thyroidectomy, thyroidectomy

Introduction

The first recorded thyroidectomy attributed to Abdul Kasan Abis in Baghdad in AD 500. The mortality rate from thyroid surgery by 1850 was 40%. Albert theodor Billroth (1892 - 1894), one of the most prominent surgeon of life time, reduced his thyroidectomy mortality rate from 40% to 8%. (1) The greatest advance in thyroid surgery came in hands of Theodor Kocher, who performed more than 5000 thyroidectomies. He was extremely meticulous and paid close attention to haemostasis. He was the first surgeon to systematically ligate the inferior thyroid artery which reduced significantly the risk of haemorrhage. His mortality rate reduced from 12.6% in 1870 to 0.2% in 1898.(1)

After 20th century further retirements and advancements in surgical techniques led to dramatic decrease in complication rate which caused safe and effective approaches to thyroid surgery. Still is not free from risk of complications like injury to recurrent laryngeal nerve, injury to external branch of superior laryngeal nerve and injury to parathyroid glands. The two most common complications are hypocalcemia and injury to recurrent laryngeal nerve.(2) Surgical aids like loupes, microscope, fine bipolar forceps, liga-clips and harmonic knives are useful and should be encouraged to facilitate surgeon.(3). In 1975, Attic and Khafit described a fine dissection technique using magnification in thyroid surgery. Amit Kumar et al (2018)done a study on microscopical thyroidectomy, a prudent option. In that study they found the use of microscopes provides excellent magnification and helps to visualise the critical structures.(4) The basic aim of our study was to study the effectiveness of operating microscope in thyroid surgery.

Aims and objectives

- 1) To study the effectiveness of operating microscope in thyroid surgery
- 2) To compare the outcome of microscopic versus conventional technique in thyroid surgery

Materials and Methods

It was prospective comparative study with study group patients posted for thyroid surgeries like hemithyroidectomy, sub- total thyroidectomy and total thyroidectomy were included in the study.

Patients divided into two groups:

Group A - consists of patients undergone microscopic thyroid surgery.

Group B – patients undergone conventional thyroid surgery without the use of microscope .

Place of study – Tertiary care hospital.

Inclusion Criteria – Patients posted for thyroid surgery

All Age groups

All Genders

Exclusion criteria – Revision surgery

Patients not willing to participate

Table 1: Age (in years) of participants

| Particular | Conventional | Microscopic |
|------------|--------------|-------------|
| N | 23 | 15 |
| Mean | 47.4 | 43.7 |
| SD | 10.1 | 14.7 |
| Range | 35-62 | 31-65 |

Unpaired t = 0.9439, p = 0.3512

Age of patients recruited for conventional and microscopic surgery are similar.

Table 2: Gender of participants

| Gender | Conventional n (%) | Microscopic n (%) |
|--------|-----------------------|----------------------|
| Male | 15 (60.0) | 8 (53.3) |
| Female | 10 (40.0) | 7 (46.7) |

Chisquare = 0.1705, p = 0.6797

Gender wise proportion of patients recruited for both treatment modalities are same.

Table 3: Surgeries done

| Surgeries | Conventional n (%) | Microscopic n (%) |
|------------------------|-----------------------|----------------------|
| Hemithyroidectomy | 11 (44.0) | 15 (100.0) |
| Subtotal Thyroidectomy | 9 (36.0) | 0 |
| Total Thyroidectomy | 5 (20.0) | 0 |

Operation Time (in minutes):

Conventional (Mean±SD): 112.04±18.4

Microscopic (Mean±SD): 142.3±16.5

Unpaired t = 5.228, p <0.001

Operation time required to perform microscopic surgery is significantly high than time required by conventional surgery.

Table 4: USG finding wise operation time (Mean±SD) (in minutes)

| USG finding | Conventional | | Microscopic | | Unpaired 't' value | p value |
|-------------------------------|--------------|-------------------|-------------|-------------------|-----------------------|---------|
| | | Operation time | | Operation time | | |
| Colloid Goiter | | 113.8±3.9 | | 138.4±3.8 | 11.568 | <0.001 |
| Cystic lesion | | 95.9±15.9 | | 133.3±18.9 | 4.146 | 0.0012 |
| Solitary Thyroid Nodule | | 134.0±3.5 | | 160.8±2.9 | 12.628 | <0.001 |

USG finding wise comparison of operation time taken to perform Conventional and Microscopic surgery revealed that for each of the finding time required for microscopic surgery was significantly high than that of conventional surgery.

Table 5 : FNAC finding wise operation time (Mean±SD) (in minutes)

| FNAC finding | Conventional | | Microscopic | | Unpaired 't' value | p value |
|------------------------|--------------|-------------------|-------------|-------------------|-----------------------|---------|
| | | Operation time | | Operation time | | |
| Adenomatous | | 111.9±11.9 | | 143.7±12.4 | 4.989 | 0.0002 |
| Colloid Goiter | | 98.5±18.1 | | 130.0±17.1 | 3.114 | 0.0099 |
| Follicular lesion | | 126.7±15.3 | | - | - | - |
| Papillary Carcinoma | | 134.0±1.7 | | - | - | - |
| Cystic lesion | | - | | 155.8±10.9 | - | - |

Time taken to perform microscopic surgery was significantly high than time taken to perform conventional surgery in patients with FNAC findings of Adenomatous and Colloid Goiter.

Table 6: Post-Op Complications

| Complications | Conventional | Microscopic |
|------------------------------|--------------|-------------|
| Hypocalaemia (transient) | 0 | 2 (13.3%) |
| Lt RLN (transient) | 0 | 2 (13.3%) |
| Rt RLN palsy (Not Recovered) | 3 (12.0%) | 0 |

Though proportion of post-op complications is more in patients undergone microscopic surgery than those undergone conventional surgery, all post-op complications were 'transient' in patients undergone microscopic surgery while 'not recovered' in patients undergone conventional surgery.



Image 1: Surgeon performing thyroid surgery using operating microscope



Image 2: Left recurrent laryngeal nerve

Results

Total 40 patients were studied. Among that we did microscopic thyroidectomy in 15 patients and conventional thyroidectomy in 25 patients. In microscopic group we did only hemithyroidectomy in 15 patients. In conventional way we did hemithyroidectomy in 11 patients, subtotal thyroidectomy in 9 patients and total thyroidectomy in 5 patients. Time taken to perform microscopic surgery was significantly high than time taken to perform conventional surgery. In microscopic thyroid surgery group we have seen complications like hypocalcaemia and recurrent laryngeal palsy but they were of transient nature. where as in conventional thyroidectomy patients we observed right recurrent laryngeal palsy in 3 patients (12%) and it was permanent.

Discussion

In 1938 lahey first time used magnification for thyroid surgery . he recommended use of Binocular loupes and he was able to magnify nerve by two and half times.(5) Use of operating microscope by ENT surgeon is routine. But microscopic thyroid technique is not much explored technique. Operating microscope provides better illumination and magnification allowing for greater precision in dissection and haemostasis. In our comparative study we did 15 cases microscopically. We used 410 mm focal distance since it was comfortable for the hand eye co-ordination, as thyroid gland is exposed we shifted to operating microscope(Zeiss). At lower pole first we identified inferior thyroid artery and its branches. Then we identified boundaries of Behr's triangle. We traced branches of inferior thyroid artery until we identify by both superior and inferior parathyroids. After that we trace recurrent laryngeal nerve right from thoracic inlet till it enters cricothyroid joint. Under magnification we can easily trace the nerve and sometimes branches of recurrent laryngeal nerve.

Similarly at superior pole under magnification, it is very easy to identify external branch of superior laryngeal nerve after that we ligate superior thyroid vessels leaving behind no thyroid tissue. By conventional technique we followed similar steps. The difference we found that though surgery using operating microscope requires much more time , it helps to identify critical structures like RLN and EBSLN parathyroids easily

A study done by Amit kumar et al in 2018 , recommended use of microscope in thyroid surgery. They found microscope is good dissection tool and they were able to inspire their trainee about thyroid surgery.(4)

Post operatively we found permanent RLN palsy in 3 patients in conventional group.

Amongst that in two patients we did total thyroidectomy and among microscopic thyroid surgery group. we found hypocalcemia in 2 patients and left recurrent laryngeal palsy in 2 patients but these were transient. our explanation for this is, over handling under microscope.

Limitation of our study is that we have less sample size.

Conclusion

Microscopic thyroidectomy helps in superior illumination and magnification of the path of surgical process. Vital structures injury or complication rate is comparatively less in microscopic surgery. Also we can attach camera to microscope for recording and teaching purpose. However research with greater sample size is recommended for further evaluation.

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