Section: ENT

Original Research Article

UNCOVERING THE BENEFITS OF MICROSCOPE IN HEAD AND NECK SURGERIES – A RETROSPECTIVE OBSERVATIONAL STUDY AT TERTIARY CARE CENTRE

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Abstract

Background: Microscopic surgeries in ENT is not a new surgical technique but it's use in head and neck surgeries is limited over conventional techniques. A total of 50 benign head and neck cases were equally divided into Microscopic Type and Traditional Type group and post operative complications, optimum working distances and magnification at every step of surgery were noted. We find this technique easy to adopt to identify the critical structures more precisely and preserve them efficiently thereby having excellent surgical outcomes. **Materials and Methods:** This study includes 50 patients of benign head and neck diseases which comprises of 16 patients of thyroid disorders, 12 of parotid disorders, 8 of submandibular disorders and 14 of Tonsillitis. Patients were divided equally into two groups – MT group (Microscopic Type) & TT group (Traditional Type). The two groups were similar in age, sex, surgical techniques and all the patients were assessed post operatively. All the surgical steps like skin incision, identification of critical structures, delivery of glands/tumor were done under microscope and depending upon the area of work and critical structures magnification was increased accordingly. **Conclusion:** Using microscope in head & neck cases significantly reduces the complications without increasing the operative time. It provides excellent magnification, illumination leading to excellent surgical outcomes.

INTRODUCTION

The presence of Head & Neck diseases is a frequent reason for the patients to seek ENT consultation for which patients had been treated surgically by traditional methods depending upon the diagnosis. In 1921, Carl Olof Nylen used monocular Brinell-Leitz microscope which after a period of 1 year was modified by Gunnar Holmgren to binocular microscope with a light source which further provided depth perception & illumination that were vital for deep cavities existing in ENT area & thus having good surgical outcomes.[1-4]

In the present scenario, similar concept i.e use of magnification is the keystone for all the surgeries. A microscopic surgery is not a new concept but it has not been explored much in head & neck cases. Due to the complex anatomy of Head & Neck, the rate of post op complications still remain high having serious repercussions on patient's quality of life. Microscope being the versatile tool provides considerable magnification & illumination at each step of the surgery allowing precise dissection & hemostasis.[5-7]

Therefore, the aim of the present study was to analyze the benefits of microscopic aided surgeries over the conventional surgeries.

MATERIALS AND METHODS

The present study is a Retrospective observational type of study conducted at VCSG medical college, Srikot Tertiary center from June 2021- June 2023.

Total 50 patients were enrolled in the study and Ethical approval was obtained from IEC. Types of surgery, post op complications & post op nerve function were analyzed descriptively.

Inclusion & Exclusion Criteria

All benign cases of head & neck diseases with age group more than 18 years were included in our study. All the malignant cases, pre op nerve palsy cases,

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pregnant & lactating mothers were excluded from our study.

Methodology

Detailed review of case notes and hospital records for all the eligible patients were taken & data was extracted. For all the cases, routine pre op work up like USG, FNAC was done to confirm the diagnosis and surgery was planned according to the diagnosis made. Data were analyzed descriptively for frequency & percentage using MS Excel. For all the cases, ZEISS EXTARO300 microscope was used & all the cases were done by the same surgical team. This study includes 50 patients of benign head and neck diseases which comprises of 16 patients of thyroid disorders, 12 of parotid disorders, 8 of submandibular disorders and 14 of Tonsillitis. Patients were divided equally into two groups – MT group (Microscopic Type) & TT group (Traditional Type). The two groups were similar in age, sex, surgical techniques and all the patients were assessed post operatively. All the surgical steps like skin incision, identification of critical structures, delivery of glands/tumor were done under microscope and depending upon the area of work and critical structures magnification was increased accordingly.

RESULTS

This study included 16 patients of thyroid benign disorders in which 8 cases were of MT group & 8 cases were TT group having more female preponderence than males with ratio of 1:1.2. Similarly, 12 cases of parotid were operated MT group – 6; TT group- 6 with M:F ratio of 2:1.We had taken 8 patients of Submandibular gland disorders with M:F of 3:1. 14patients of chronic tonsillitis were included in our study MT group-7; TT group-7 with M:F ratio of 1:1.3. [Table 1]

All cases of benign thyroid disorders presented with anterior neck swelling, pre op work up was done & USG findings showed higher cases of Colloid Goitre (62.5%) followed by Benign thyroid nodule (25%) & Multinodular Goitre (1%) in both the groups, respectively. Pre-op work up done in all parotid cases showed 83.3% cases of pleomorphic adenoma & 16.6% of warthin tumor in our study. Pre-op USG/ CT scan in Submandibular disorders showed 50% cases of sialdenitis followed by 37.5% cases of sialolithiasis & 12.5% cases of Benign pleomorphic adenoma in both the groups.[Table 2]

Most common surgical procedure for thyroid disorder done was Hemithyroidectomy which accounted for 14 cases (87.5%) in both the groups. Lateral to medial approach was used to identify Recurrent laryngeal nerve, inferior thyroid artery, parathyroid glands at a magnification of 1.5-2.5X. There was no significant difference in the operative time which remained 60-180 minutes (~90 minutes) for both the groups. 12.5% of patients with Transient nerve palsy presented with change in voice post operatively which resolved within week time in microscopic group while 25% patients presented in the traditional group.[Table 3,4]

In parotid surgeries, Antegrade method was used to identify the facial nerve trunk along with its terminal branches at a magnification of 2-2.5X. Superficial parotidectomy was done in 60% of MT group cases & 33.3% of TT group while Total conservative Parotidectomy was done in 8.3% of MT group & TT group each. Only 1 patient of TT group had temporary facial paresis due to stretching of the Marginal mandibular nerve which completely resolved within few weeks post operatively. None of the patient developed Frey's syndrome in our follow up.[Table 3,4]

Figure 1: Intra op image showing RLN & ITA relation (Thyroidectomy)

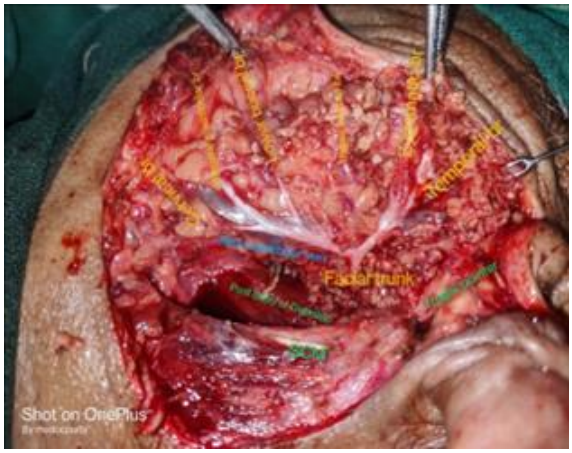

Figure 2: Intra op image showing facial nerve trunk & terminal branches (Parotidectomy)

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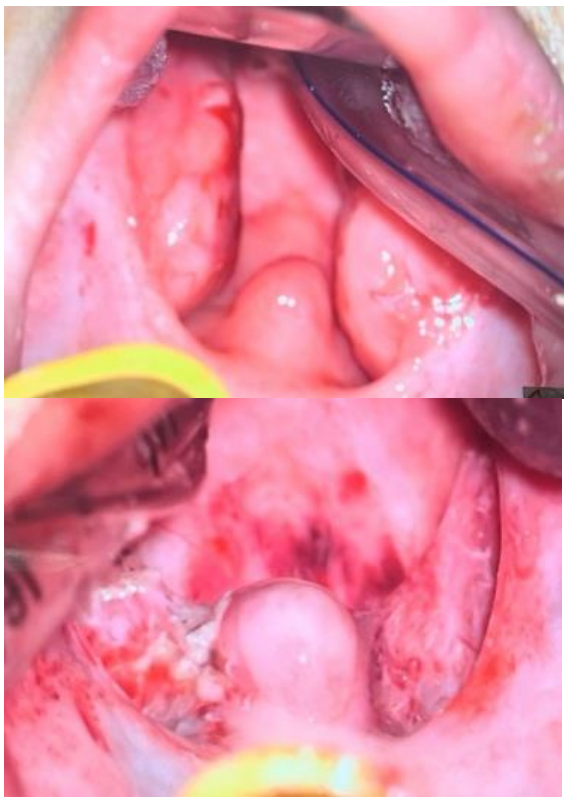

Figure 3: Intra op image of microscopic tonsillectomy

Transcervical approach was used in submandibular gland excision cases. Marginal mandibular nerve, hypoglossal nerve, lingual nerve were identified & preserved at magnification of 2-2.5X. Post op only 1 patient of TT group presented with marginal mandibular paresis in our study.[Table 3,4]

In tonsillectomies at magnification of 1.5-2X- capsule, paratonsillar vein, lower pole of tonsil were identified leading to minimal blood loss. Duration of surgery was approximately 30-45 min in MT group while 45-60 min in TT group. Post op duration of stay in hospital & post op pain was lower in MT group than TT group.[Table 3,4]

Various observations regarding working distance and magnification at different steps of surgery were made. Lower magnifications provides large field of vision so while dealing with skin incision, platysma, muscles, capsule of tonsil we used magnification in the range of 0.4x-1x and while dealing with the critical structures like Recurrent Laryngeal Nerve, Inferior thyroid artery, Parathyroid glands, Facial nerve trunk & its terminal branches, Marginal mandibular nerve, Hypoglossal, Lingual nerve, Paratonsillar vein we increased our magnification in the range of 1.5x-2.5x.[Table 4]

Table 1: Distribution of cases according to the gender among groups

Surgeries	No of patients (n=50)	MT Group	TT Group	M:F
Thyroidectomies	16	8	8	1:1.2
Parotidectomies	12	6	6	2:1
Submandibular gland excision	8	4	4	3:1
Tonsillectomies	14	7	7	1:1.3

Table 2: Distribution of various conditions by USG/FNAC findings among the groups

Disorders	USG/FNAC Diagnosis	MT group	TT group
Thyroid disorder	Benign thyroid nodule	2 (25%)	2 (25%)
	Colloid Goitre	5 (62.5%)	5 (62.5%)
	Multinodulargoitre	1 (12.5%)	1 (12.5%)
Parotid disorder	Pleomorphic adenoma	5(83.3%)	5(83.3%)
	Warthin tumor	1(16.6%)	1(16.6%)
Submandibular gland disorder	Sialdenitis	2(50%)	2(50%)
	Sialolithiasis	2(37.5%)	1(37.5%)
	Benign Pleomorphic adenoma	1(12.5%)	1(12.5%)

Table 3: Distribution of various postoperative complications among the groups

Disorder	Complications	MT group	TT group
Thyroid	Hypocalcemia	12.5%	25%
	U/L VC palsy	0	12.5%
	B/L VC palsy	0	0
	Haemorrhage	0	0
Parotid	Facial nerve Injury	0	12.5%
	Hematoma	0	0
	Seroma	0	0
	Frey's Syndrome	0	0
Submandibular gland	Marginal mandibular nerve injury	0	12.5%
	Hypoglossal nerve injury	0	0
	Orocutaneous fistula	0	0
Tonsillectomy	Blood loss	<15ml	>40ml
	Duration of surgery	30-45 minutes	45-60 minutes
	Duration of hospital stay	3 days	7 days
	Post op hemorrhage or pain	0	1

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Table 4: Distribution of Types of surgery among the groups

Disorder	Type of surgery	MT Group	TT Group
Thyroid disorder	Right Hemithyroidectomy	75%	50%
	Left Hemithyroidectomy	12.5%	37.5%
	Total Thyroidectomy	12.5%	12.5%
Parotid disorder	Superficial Parotidectomy	41.6%	33.33%
	Total conservative Parotidectomy	8.3%	8.3%

Table 5: Working adjustments at different steps of surgery

Magnification	Working Distance	Diameter visualised (cm)	Area to work on
0.4x	415 mm	15	Skin, platysma, strap muscles
0.6x	415 mm	15	Skin, platysma, strap muscles
1x	415 mm	13	Skin, platysma, strap muscles, Capsule of tonsils
1.5x	415 mm	12	Superior pole, RLN, Inferior thyroid artery
2x	415 mm	8	RLN, Facial nerve, Lingual nerve, Hypoglossal nerve, paratonsillar vein
2.5x	415 mm	5	Parathyroid dissection

DISCUSSION

Using microscope is a natural extension for ENT surgeons and the magnification, illumination that microscope provides is unmatched with the conventional methods. Microscopic aided surgeries not only provides magnification but also allows safe manipulation of to-be-resected tissues & good preservation of the normal tissues.

Considering the thyroid surgeries, the 1st documented use of magnification was described by Lahey in 1938 where he recommended use of Berney binocular loupes & magnified recurrent laryngeal nerve by 2.5 times.[8] Due to the variations in location of Recurrent Laryngeal Nerve, it poses maximum risk of injury which can lead to functional loss to the patient. the reported rate of RLN injury from world centres of excellence being 0.25-0.7%.[9,10] Thus, by using lateral to medial approach RLN nerve was identified in Lore's triangle at higher magnification which not only reduced its injury risk but also aided us to visualize small Parasympathetic fibers accompanying the main nerve. Another dreaded complication which increases morbidity in thyroidectomy patients is Hypocalcemia. As we know, parathyroid gland anatomy is inconsistent so by using microscope all 4 Parathyroid glands along with its blood supply from Inferior thyroid artery and its branches were identified clearly at 2.5X thereby reducing post op complications significantly. Dorzai et al retrospectively analyzed 738 patients over a period of 10 years who showed remarkably results using magnification in thyroid surgeries.[9]

In microscopic aided parotid surgeries, antegrade method was used to identify the tragal pointer which not only helped us in identifying facial nerve trunk & its terminal branches but also helped us in visualizing small multiple nerve fibers accompanying the terminal branches which usually gets missed while operating by traditional methods. Even the intercommunicating branches if stretched can lead to facial palsy that can be avoided by using microscope. Carta et al performed microscopic assisted parotidectomies for parotid tumor which resulted in fine dissection & reduced post op facial nerve dysfunction rate which is in accordance with our study.[6]

In patients presenting with complaints of submandibular gland mass, sialolithiasis, sialdenitis-submandibular gland excision was planned. Transcervical incision was given and capsule, facial artery & vein, lingual nerve, hypoglossal nerve, submandibular duct were identified and preserved at magnification of 1.5-2.5x. The complication rate of stretching or injury to marginal mandibular nerve was lesser in microscopic aided surgery.

In microscopic assisted tonsillectomies, the incision was given at the junction of palatoglossal arch mucosa & tonsils while in TT group incision was given closer to tonsils. Microscopic tonsillectomies led to reduced blood loss, short duration of surgery, less post op pain & hospital stay with less chances of primary and secondary hemorrhage as compared to conventional method. Injury to paratonsillar vein is an important and major cause for bleeding during surgery by conventional method. One can see detailed anatomy of extracapsular tissue, tonsillar bed, blood vessels, lower pole under microscope resulting in good surgical outcome [12]. In addition, trainees can directly see surgical steps through monitor which shows enlarged view of narrow oral cavity.[11,12]

Proper hand eye coordination along with the working distance is important for every surgeon using microscope. We have done all our cases around 415mm distance in standing position. Finding optimal distance to work comfortably is surgeon specific like D'orazi et al. has used 431mm working distances in their cases.[9]In addition to the surgical benefits, it also provides ergonomic benefits to the surgeons by maintaining upright posture with neutral cervical position thus reducing occupational musculoskeltal risk which is in accordance with Davidnson et al study.[5]

By including microscope in head and neck cases we can record all the data easily which can be used in medicolegal cases as well as by trainees to enhance their knowledge & surgical skills thus becoming great teaching tool for young surgeons.

Ent surgeons use microscope vividly for ear surgeries so transition from conventional to microscopic

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methods is not so difficult for them but surgeons who are not in routine use of microscopes may find it difficult to adapt initially which has been concurred by Nielsen in his study also that otologists who are already accustomed with use of microscope find this technique easy to adapt.[13,15]

Limitation of our study is small sample size, only benign cases were included in our study and microscopic optics needs further more research.

CONCLUSION

Using microscope in head & neck cases significantly reduces the complications without increasing the operative time. It provides excellent magnification, illumination leading to excellent surgical outcomes. All the data can be recorded which can be used for academic purposes as well as for medicolegal aspects. Thus, we recommend use of microscope over conventional methods for head and neck surgeries.

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