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To Compare Between Endoscopic Assisted Neck Dissection and Robot Assisted Neck Dissection Over Conventional Neck Dissection in Oral Cancer –A Systematic Review

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Abstract
Background: *Neck dissection is an integral component of the treatment of head and neck cancers. The present meta analysis aimed to compare the use of endoscope assisted neck dissection (END) with conventional neck dissection (CND) in the existing English literature.*
Methods: *A search of PubMed (MEDLINE), Embase, and the Cochrane Library for articles reporting the results of the two techniques of neck dissection was completed independently by two individuals. The authors analyzed the data from each study using a random effects model.*
Results: *The pooled analysis demonstrated comparable lymph node yield, intraoperative blood loss, incidence of locoregional recurrence, and incidence of complications between the two groups. A significantly longer operative time but a shorter length of hospital stay was observed in the END group compared with the other group.*
Conclusions: *Compared with conventional techniques, END offers similar oncologic outcomes and complication rates; however, it requires a longer operative time. Future studies with long term follow up and assessment of patient satisfaction are needed to confirm the clinical use of END.*

Keywords: *Endoscope, Neck dissection, Neck lymphadenectomy.*

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I. Introduction

Neck dissection is credited as being developed as a cervical metastasis treatment by George Washington Crile of the Cleveland Clinic. In 1900 he conducted a variety of neck dissections, and in his influential essay published in the Transactions of the Southern Surgical and Gynecological Association in 1905 he described the conventional protocol for the radical neck dissection (RND). This technique serves as the foundation for all neck dissections, and all other techniques are presented as modifications of this initial technique.

Hayes Martin from Memorial Sloan-Kettering Cancer Center popularized this treatment by outlining the detailed RND technique in his groundbreaking 1951 publication. Due to the cosmetic deformity and impaired shoulder mobility caused by the en bloc resection of the accessory nerve, sternocleidomastoid muscle, internal jugular vein, and tail of the parotid gland, this surgical procedure is not without serious side effects. Oswaldo Suarez, an Argentine surgeon, first described functional neck dissection, commonly referred to as modified radical neck dissection (MRND), in 1963. Keeping the sternocleidomastoid muscle, internal jugular vein, and spinal accessory nerve intact, he described removing all five lymph node levels from the neck to minimize any functional impairment in the shoulder**.**

Classification

The technique created at Memorial Sloan-Kettering Cancer Center in the 1930s is used to classify cervical lymph nodes. The lymph nodes in the lateral part of the neck are divided into five nodal levels by this

system, which are I through V. These levels are explained below. Level VII lymph nodes are located in the superior anterior mediastinum, while category level VI lymph nodes are found in the central compartment. For neck node levels, the following are the clinical and surgical landmarks:
1.Level I boundaries (submental triangles are level Ia, submandibular triangles are level Ib) are:
Superior: the bottom edge of the mandibular body;
posterior, or the digastric belly
Hyoid bone on the inferior

2.The node-bearing tissue in Level II (the upper jugular lymph nodes) is delimited anteriorly by the accessory nerve and posteriorly by the trapezius and suboccipital muscles. Level IIa starts at the posterior edge of the submandibular gland and extends to the accessory nerve.
The base of the skull is called superior.
Boundary of the Sternocleidomastoid Posteriorly
The sternohyoid muscle's anterior-lateral limit
inferior-hyoid bone

3. Level III borders (middle jugular lymph nodes) are:
Hyoid bone, superior
boundary of the sternocleidomastoid posteriorly
The lateral limit of the sternohyoid is anterior;
Below: the cricothyroid membrane

4. Level IV, or lower jugular lymph nodes, borders are as follows:
Above: the cricothyroid membrane
boundary of the sternocleidomastoid posteriorly
The sternohyoid muscle's anterior-lateral limit
The inferior clavicle

5. Level V (Posterior triangle of the neck)
Level Va is the tissue above the omohyoid's posterior belly, level Vb is the node-bearing tissue between the omohyoid's posterior belly and the clavicle/thoracic inlet, and level V is the posterior triangle of the neck. Borders consist of:
Frontal edge of the trapezius is known as the posterior.
The anterior boundary of the sternocleidomastoid is the posterior border.
The inferior clavicle

6. Level VI: the neck's major chamber Hyoid bone is on the superior side, while the suprasternal notch is on the inferior side.
Lateral: The carotid sheath's medial edge on either side

7. Level VII: the lymph nodes in the upper mediastinal area Borders consist of:
The suprasternal notch is superior.
Lower extremity: innominate artery

Types of Neck Dissections
The types and indications of various types of neck dissection are as follows:
1. Radical neck dissection (RND): the ipsilateral sternocleidomastoid muscle (SCM), parotid tail, spinal accessory nerve (SAN), internal jugular vein (IJV), and level I–V lymph nodes are all removed during this procedure. RND is necessary when there is significant soft tissue involvement due to bulky nodal disease in the neck caused by extra-capsular dissemination.
2. Modified radical neck dissection type I (MRND-I): With the spinal accessory nerve preserved, lymph nodes from levels I–V, the ipsilateral sternocleidomastoid muscle, and the internal jugular vein are removed. When the accessory nerve is unaffected, bulky nodal illness with extracapsular dissemination including the SCM and IJ is an indication for MRND-I.
3. Removing lymph nodes from level I–V and the ipsilateral sternocleidomastoid muscle while maintaining the integrity of the accessory nerve and IJV is known as modified radical neck dissection type II (MRND-II). Bulky nodal diseases involving the SCM but sparing the IJ or auxiliary nerve are indications for MRND-II.

4. MRND-III, or modified radical neck dissection, involves removing lymph nodes from levels I through V while preserving SCM, IJV, and SCM. When a patient has metastatic disease with limited extracapsular dissemination and dissects the auxiliary nerve, IJ, and SCM free, MRND-III is recommended.

Indications:

1. Supraomohyoid neck dissection (SOHD): Levels I–II lymph nodes are removed, but the accessory nerve, SCM, and IJV are left intact. For primary SCC or malignant melanoma, if the primary location is in the lower eyelid or anterior to the ear, SOHD is appropriate in the N0 neck (but should include parotidectomy for face, forehead, and anterior scalp).
2. Selective neck dissection (SND): lymph nodes at levels Ib–IV are removed, leaving IJV, SCM, and SAN unharmed. When there is N1 illness in these primary sites, or SCC of the lateral tongue, oral cavity, or anterior floor of the mouth, the procedure is suggested in the N0 neck.
3. Lateral neck dissection, which is technically also known as selective neck dissection, involves removing lymph nodes from levels II–IV while leaving the accessory nerve, SCM, and IJV intact. Any N-stage neck for differentiated thyroid cancer, melanoma with a positive sentinel lymph node draining to these nodal basins, or SCC of the larynx and hypopharynx without considerable extracapsular dissemination are indications for this surgery. This surgery is also necessary for certain primary parotid cancers.
4. Posterolateral neck dissection: Preserving IJV, SCM, and SAN while removing levels II–V, suboccipital, and retroauricular nodes. This method is indicated for any N-stage neck cutaneous melanoma with high-risk characteristics or melanoma whose primary location is posterior to the ear and which has a positive sentinel node.
5. Modified radical neck dissection: As described above. This procedure has an indication for thyroid cancer and upper aerodigestive carcinomas with positive lateral neck nodes but limited extracapsular spread.

Contradictions

- Except for unresectable diseases, there are no absolute contraindications to neck dissection other than those that render a patient unsuitable for general anesthesia and resection. Related contraindications consist of: [12][13]
- Severe respiratory illness, COPD with reduced capacity to operate
- Candidates who have preoperative imaging demonstrating deep tumor involvement in the prevertebral area, levator scapula muscle, scalene muscles, phrenic nerve, and brachial plexus should not be considered.
- The principal inoperable tumor.
- Remote metastatic illness
- Carotid artery tumor encasement (NOTE: many authors consider this to be a "unresectable disease," since even if it is theoretically viable, resection and grafting do not improve survival or local control)In [14]

Absolute contraindication:
Fixed neck mass in the deep neck muscles, prevertebral fascia, and/or skull base involvement (unresectable disease)

Technique

An incision is made in the middle of the neck in a pre-existing skin crease. While there have been numerous historical incisions, such as the Latyshevsky and Freund, Mac Fee, Crile, Kocher, Schobinger, and Hockey stick, current head and neck surgery only uses one incision. Trifurcate incisions were common in the past and are still useful if there is substantial posterior neck illness; however, the carotid artery should not be covered by the trifurcation.

Enhancing skin flaps: The skin incision is made deeper by passing into the platysma muscle and subcutaneous tissue. After that, the posterior flap is elevated in the subplatysmal plane by counter-traction of the deeper soft tissues and traction of the flap using skin hooks. The flap is raised to the trapezius muscle's anterior border.

Marking the Marginal Mandibular Nerve: It is essential to locate the facial nerve's marginal mandibular branch with precision. At this point in the procedure, some surgeons advise against using paralytics. Continued elevation of the flap exposes the larger auricular nerve and the external jugular vein covering the sternocleidomastoid muscle posteriorly. Thorough identification and preservation are necessary for the larger auricular nerve and the external jugular vein. Instead of using electrocautery, which could temporarily injure the nerve, we recommend using a scalpel or scissors to dissect around the mandibular branch. The submandibular fascia and the posterior facial vein are both superficial to this nerve. The facial nerve's marginal branch is shielded by ligating the vein and retracting its upper stump cephalad—a operation known as the Hayes Martin maneuver. Alternatively, it is possible to skeletonize and retain the marginal mandibular nerves and the facial vein separately. If it is oncologically sound to execute this dissection, it can significantly enhance the vessel length accessible for microvascular repair, and this should be reviewed with the reconstructive and ablative surgeons prior to surgery. If necessary, it is now possible to dissect the peri-facial nodes.

Superior Dissection: The anterior bellies of the digastric muscles and the mylohyoid are separated from the fibrous fatty tissue of the submental triangle. After dissecting the fascia from the digastric muscle's anterior belly, the specimen is withdrawn posteriorly to remove the fibrous fatty tissue that contains lymph nodes lateral to the mylohyoid muscle. The lingual nerve and the submandibular gland duct are split when the dissection reaches the posterior border of the mylohyoid, which is then retracted anteriorly. At last, the facial artery is sutured beneath the digastric muscle's posterior region as it passes forward. Alternately, the facial artery and vein can be dissected through the substance of the submandibular gland to increase the length of these vessels available for microvascular anastomosis, or if a submental flap is planned. The tail of the parotid gland is elevated off of the SCM and deep structures, and the sternocleidomastoid muscle is then incised close to its insertion in the mastoid process. The fibro-fatty tissue medial to the muscle is incised, exposing the splenius capitis and the levator scapulae muscles. Otherwise, incising the fascia below the digastric muscle and gentle inferior traction of the specimen allows identification of the hypoglossal nerve, the upper end of the internal jugular vein, and the spinal accessory nerve. At this stage of dissection, the surgical specimen is inferiorly reflected by the internal jugular vein and the spinal accessory nerve, both of which have been identified and preserved.

Inferior dissection: The anterior border of the trapezius muscle is dissected along posteriorly and inferiorly. The transverse cervical vessels and the spinal accessory nerve split as they approach the anterior border of the trapezius muscle. At this stage of the procedure, it is important to protect the branches of the cervical plexus that innervate the levator scapulae muscle, unless the severity of the neck disease prevents it. The superficial layer of the deep cervical fascia and the sternocleidomastoid muscle are incised above the superior border of the clavicle. The external jugular vein and the omohyoid muscle may be kept or removed, depending on the reconstructive surgeon's vascular requirements. The dissection of the anterior border of the trapezius muscle occurs along its posterior and inferior borders.The transverse cervical vessels and the spinal accessory nerve separate when they approach the anterior border of the trapezius muscle.This portion of the treatment involves gently moving the fibro-fatty tissue in this location upward, exposing the brachial plexus, the phrenic nerve, and the scalenus anterior muscle. The dissection is carried out posteriorly to join the preceding dissection along the anterior edge of the trapezius.

Medial dissection: Proceeding medially with the dissection exposes the vagus nerve, common carotid artery, and internal jugular vein. Because it does not invade the deep fascia of the floor of the neck, which covers the muscles and brachial plexus, the phrenic nerve is inferiorly recognized and protected. A surgeon operating on the left side must identify the thoracic duct, which descends and advances from behind the common carotid to get into the internal jugular vein, the subclavian vein, or the angle formed by the union of these two arteries. The anterior scalene muscle and the phrenic nerve are both near to where the duct is located.

A chyle leak can be avoided by the surgeon by keeping in mind that the thoracic duct may have numerous connections at its upper end and that it usually receives a jugular, a subclavian, and possibly other minor lymphatic trunks at the base of the neck. All of these trunks need to be separately ligated or clipped.

The internal jugular vein may almost always be retained with proper procedure. If resection is necessary, it is imperative to obtain vascular loops to provide circumferential control of the artery both proximally and distally before cross-clamping and separating it. If the tumor mass is located in the mid-jugular or jugulodigastric region, the internal jugular vein is divided superiorly and initially ligated. As the dissection proceeds inferiorly, the specimen is subsequently severed from the vagus nerve, the carotid artery, and the superior thyroid arteries. If the disease is severe in the jugulodigastric area, the internal jugular vein is divided inferiorly and the dissection moves along the common carotid artery superiorly.

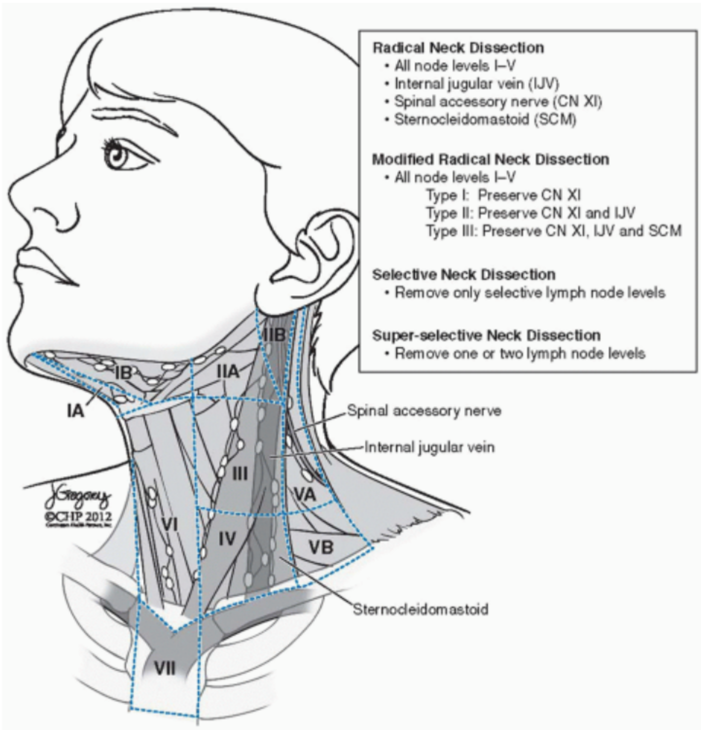
This is especially useful if the tumor is big and may require the external carotid artery or the hypoglossal nerve to be severed. By mobilizing it from below, the surgical specimen can be detached more readily from the internal carotid artery and, if feasible, the external carotid and hypoglossal nerve.

Closure: The incision closure consists of three layers: the second layer roughly corresponds to the subcuticular layer, the first layer roughly corresponds to the platysma anteriorly and the subcutaneous tissue laterally. After that, dermal adhesive can be used to sew, staple, or seal the skin. There should still be one or two suction drains in the most dependent areas, which are the inferior aspect and lateral gutter at the thoracic inlet. Any recognized nerve, the thoracic duct, the carotid artery, or the drain(s) themselves shouldn't be placed directly over them.

Complications

1. Infection.
2. Air leak.
3. Postoperative bleeding.

4. Chylous fistula. There is a range of 1% to 2.5% in the reported incidence. The amount of chyle drainage in a 24-hour period, the timing of the fistula's start, and the existence or absence of chyle deposit under the skin flaps all affect management. Surgical exploration is indicated when the chyle production surpasses 600 mL in a single day or 200 to 300 mL per day for three days, particularly when the chyle fistula is visible right away following surgery. Conservative closed wound treatment is unlikely to be successful in these situations.
5. Blindness, hypoxia, and the development of facial or cerebral edema are possible outcomes of synchronous bilateral radical neck dissections, which ligate both internal jugular veins.
6. Carotid artery rupture. Carotid artery exposure and rupture is the most dangerous and frequently fatal side effect following neck surgery. As such, every effort needs to be put into preventing it. The carotid rarely becomes exposed in the absence of a salivary fistula if the skin incisions are made with the correct design. When a carotid gets exposed, it needs to be quickly covered by tissue that has been well-vascularized.
7. The most prominent post-operative complications seen in patients undergoing radical neck dissection are associated with the excision of the spinal accessory nerve. Destabilization of the scapula results from the subsequent denervation of the trapezius muscle, which leads to drooping, anterior and lateral rotation, and gradual flaring at the vertebral boundary. The patient's capacity to abduct the shoulder past 90 degrees is lowered when trapezius function is lost. A condition of discomfort, weakness, and shoulder girdle deformity is the result of these physical alterations and is frequently linked to radical neck dissection. The severity, probability, and duration of these problems are significantly decreased by carefully executing a modified radical neck dissection.



Latest TNM Staging:-
PRIMARY TUMOR (T)
- TX Primary tumor cannot be assessed
- T0 No evidence of primary tumor Tis Carcinoma in situ
- T1 Tumor 2 cm or less in greatest dimension
- T2 Tumor more than 2 cm but not greater than 4 cm in greatest dimension
- T3 Tumor more than 4 cm in greatest dimension
- T4a Moderately advanced local disease* Tumor invades through cortical bone, inferior alveolar nerve, floor of mouth, or skin of face—that is, chin or nose (oral cavity). Tumor invades adjacent structures (e.g., through cortical bone, into deep [extrinsic] muscle of tongue [genioglossus, hypoglossus, palataglossus, and styloglossus], maxillary sinus, skin of face)
- T4b Very advanced local disease Tumor invades masticator space, pterygoid plates, or skull base and/or encases internal carotid artery

*Note: Superficial erosion alone of bone/tooth socket by gingival primary is not sufficient to classify as T4.

REGIONAL LYMPH NODES (N)
- NX Regional lymph nodes cannot be assessed
- N0 No regional nodes metastasis
- N1* Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension
- N2* Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension; or in multiple ipsilateral lymph nodes, none more that 6 cm in greatest dimension; or in bilateral or contralateral lymph nodes, none greater than 6 cm in greatest dimension
- N2a* Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension
- N2b* Metastasis in multiple ipsilateral lymph nodes, none more that 6 cm in greatest dimension
- N2c* Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension
- N3* Metastasis in a lymph node more than 6 cm in greatest dimension.

*Note: A designation of "U" or "L" may be used for any N stage to indicate metastasis above the lower border of the cricoid cartilage (U) or below the lower border of the cricoid cartilage (L). Similarly, clinical/radiological ECS should be recorded as E– or E+.

DISTANT METASTASIS (M)
- MX Distant metastasis cannot be assessed
- M0 No distant metastasis
- M1 Distant metastasis

Stage Grouping
- Stage 0- Tis N0 M0
- Stage I- T1 N0 M0
- Stage II -T2 N0 M0
- Stage III- T3 N0 M0
- ▪ T1 N1 M0
- ▪ T2 N1 M0
- ▪ T3 N1 M0
- Stage IVA -T4a N0 M0
- ▪ T4a N1 M0
- ▪ T1 N2 M0
- ▪ T2 N2 M0
- ▪ T3 N2 M0
- ▪ T4a N2 M0
- Stage IVB- Any T N3 M
- ▪ T4b Any N M0
- Stage IVC- Any T Any N M1

MATERIALS AND METHOD

Comparison between Endoscopic assisted neck dissection and Robot assisted neck dissection over conventional neck dissection in oral cancer-a systematic review

Materials and Methods

2.1. Study Protocol and Registration

This systematic review was administered in accordance with PRISMA specifications.

Articles were reported from internet database sources on 19 September 2022. This review was recorded in PROSPERO with the registration code CRD42023472501

2.2. Research Questions

The research questions considered for this systematic review included the following.

Which is better between endoscopic assisted neck dissection and robot assisted neck dissection over conventional neck dissection?

2.3. Search Strategy

A comprehensive data search was conducted in electronic online databases for original full-text research papers based on the keywords issued until December 2022. The total studies attained from each database are illustrated in Table 1. The full-text research was conducted online in three journal databases using Medical Subject Heading keywords. The articles assessed were from PubMed, Scopus and the Web of Science.

("endoscope s"[All Fields] OR "endoscoped"[All Fields] OR "endoscopes"[MeSH Terms] OR "endoscopes"[All Fields] OR "endoscope"[All Fields] OR "endoscopical"[All Fields] OR "endoscopically"[All Fields] OR "endoscopy"[MeSH Terms] OR "endoscopy"[All Fields] OR "endoscopic"[All Fields]) AND ("assistances"[All Fields] OR "assistant s"[All Fields] OR "assistants"[All Fields] OR "assisted"[All Fields] OR "assisting"[All Fields] OR "assistive"[All Fields] OR "dental assistants"[MeSH Terms] OR ("dental"[All Fields] AND "assistants"[All Fields]) OR "dental assistants"[All Fields] OR "assistant"[All Fields] OR "helping behavior"[MeSH Terms] OR ("helping"[All Fields] AND "behavior"[All Fields]) OR "helping behavior"[All Fields] OR "assist"[All Fields] OR "assistance"[All Fields] OR "assists"[All Fields]) AND ("neck dissection"[MeSH Terms] OR ("neck"[All Fields] AND "dissection"[All Fields]) OR "neck dissection"[All Fields]) AND (("robot"[All Fields] OR "robot s"[All Fields] OR "robotically"[All Fields] OR "robotics"[MeSH Terms] OR "robotics"[All Fields] OR "robotic"[All Fields] OR "robotization"[All Fields] OR "robotized"[All Fields] OR "robots"[All Fields]) AND ("assistances"[All Fields] OR "assistant s"[All Fields] OR "assistants"[All Fields] OR "assisted"[All Fields] OR "assisting"[All Fields] OR "assistive"[All Fields] OR "dental assistants"[MeSH Terms] OR ("dental"[All Fields] AND "assistants"[All Fields]) OR "dental assistants"[All Fields] OR "assistant"[All Fields] OR "helping behavior"[MeSH Terms] OR ("helping"[All Fields] AND "behavior"[All Fields]) OR "helping behavior"[All Fields] OR "assist"[All Fields] OR "assistance"[All Fields] OR "assists"[All Fields]) AND ("neck dissection"[MeSH Terms] OR ("neck"[All Fields] AND "dissection"[All Fields]) OR "neck dissection"[All Fields])) AND (("conventional"[All Fields] OR "conventionals"[All Fields]) AND ("neck dissection"[MeSH Terms] OR ("neck"[All Fields] AND "dissection"[All Fields]) OR "neck dissection"[All Fields])) AND ("mouth neoplasms"[MeSH Terms] OR ("mouth"[All Fields] AND "neoplasms"[All Fields]) OR "mouth neoplasms"[All Fields] OR ("oral"[All Fields] AND "cancer"[All Fields]) OR "oral cancer"[All Fields])

2.5. Selection Criteria

The selection parameters were:

1. Peer-reviewed articles that have been published and are indexed in PubMed, Scopus, or the Web of Science.
2. Researches published in English.

The parameters for elimination were:

1. Manuscripts that have not been published.
2. Studies that did not compare endoscopic assisted neck dissection or robot assisted neck dissection with conventional neck dissection
3. A publication language other than English.

2.6. Type of Studies Included

Randomized controlled trials will be included to compare between Endoscopic assisted neck dissection and Robot assisted neck dissection over conventional neck dissection in oral cancer.

2.7. Data Extraction (Selection and Coding)

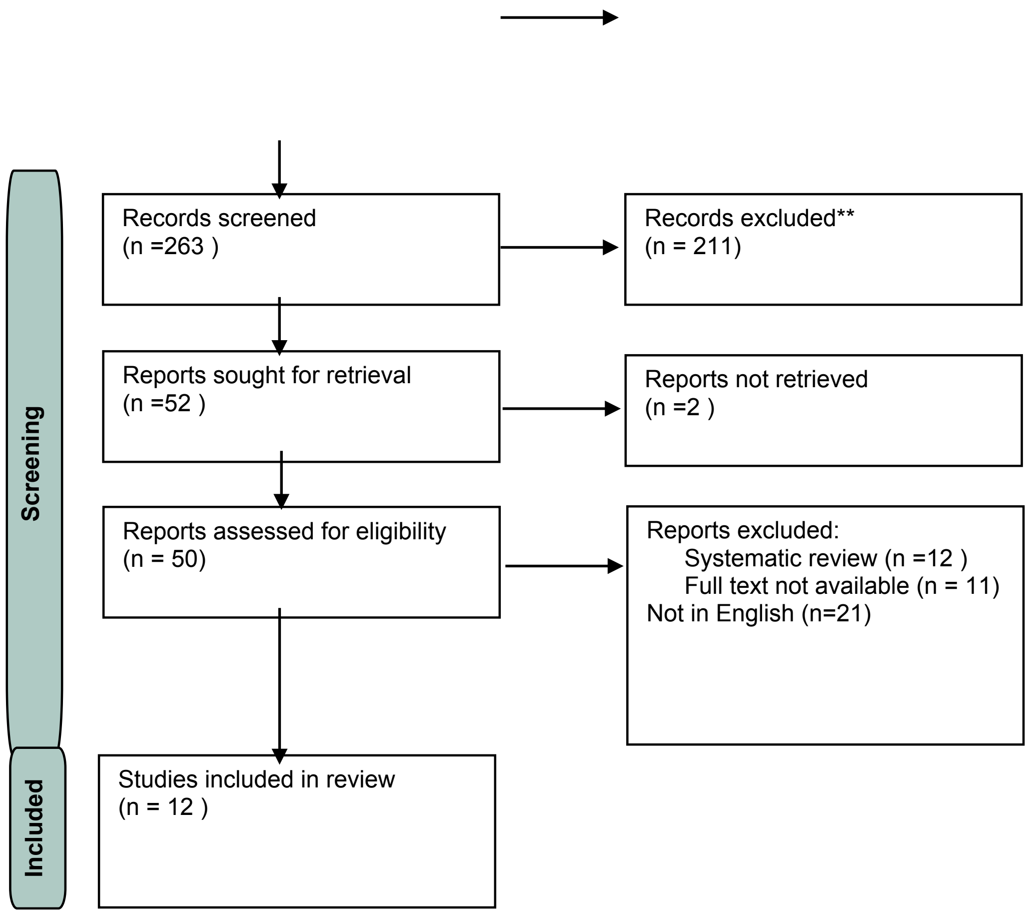
The primary review authors (G.K. and S.J.) independently screened the titles and abstracts of the literature search results together with an assigned co-screener (N.T.S.), and (J.K.N.) and (A.M.L.) provided supervisory oversight and validated the selection process. Disagreements were resolved through discussions, and the final decision was made by either S.B. or A.M.L. The full-text articles were then independently screened for inclusion and further processing. As needed, corresponding authors were contacted to provide the missing information. A distinctively customised Excel sheet was fabricated to register the data obtained from the studies.

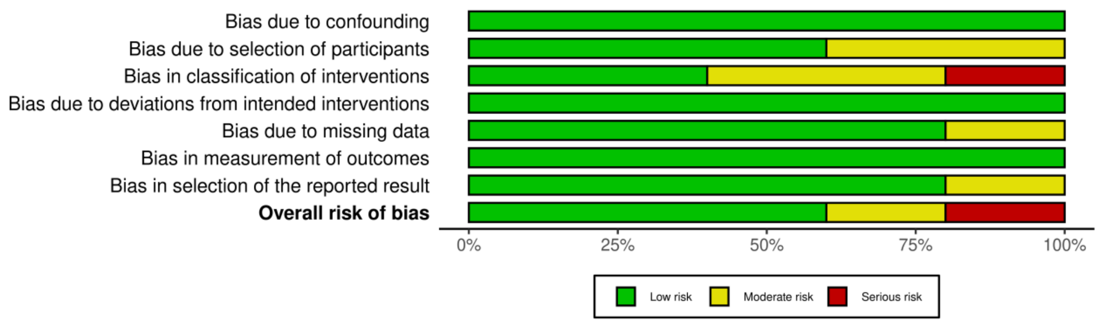
AUTHOR	YEAR	COUNTRY	STUDY DESIGN	STUDY DURATION	NO OF CASES	TREATMENT	FOLLOW UP	Average time of surgery	Lymph node	Recurrence	Complications
Renan Bezerra Lira	2017	Korea	Retrospective	2014-2015	60	Retroauricular approach	17.3 months	482 min	27.7 nodes (6–57)	4.7% leading to a DFS of 76.8%	48.8%-postoperative complications,two cervical hematomas and 16 infections.
Sannikorn et al.	2015	Thailand	Retrospective	2013-2014	32						
Shah et al	2020	India	Retrospective	2018	22						
William G. Albergotti	2015		Retrospective	2012-2014	11		19.4 months.	284.4 ± 72.3	28.5 ± 9.3	1 supraclavicular	
Salvatore Poma	2022	Italy	Retrospective	2012 - 2018	10	5-Transaxillary 5-Retroauricular		Transaxillary -166 minutes Retroauricular-153 minutes	Transaxillary-29.4 (26–33) Retroauricular-28.6 (24–36)		None

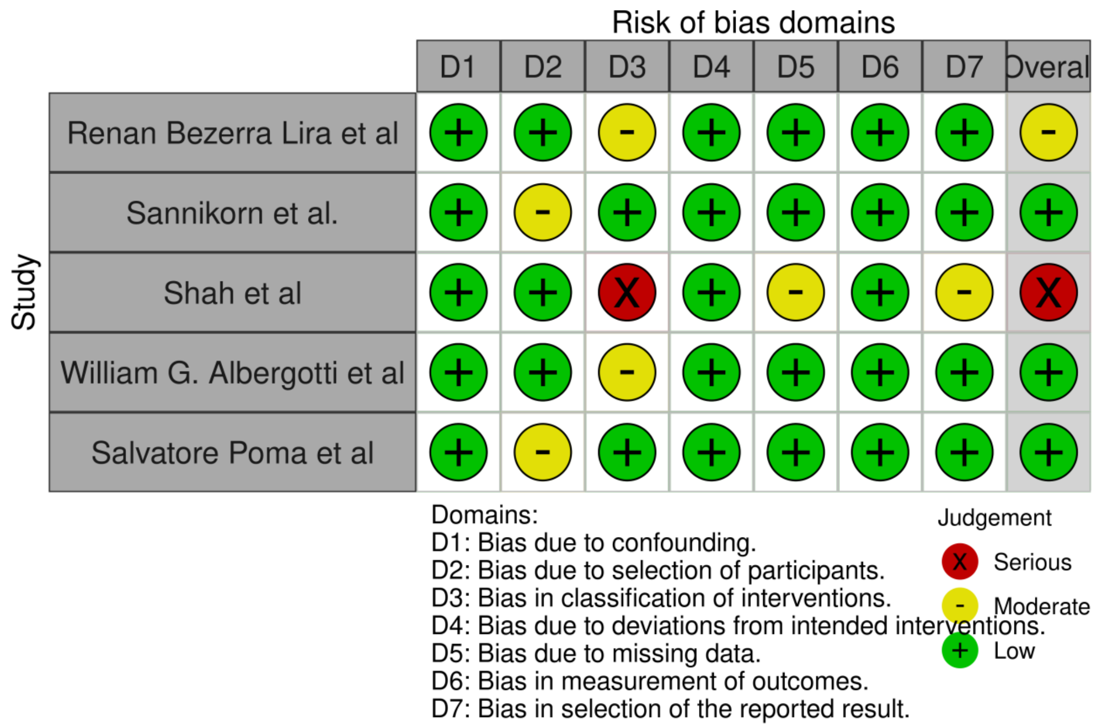
Identification

Records identified from*:
Pubmed (n = 330)
Scopus (n =125)
Web of Science (n=75)

Records removed *before screening*:
Duplicate records removed (n =45)
Records marked as ineligible by automation tools (n =32)


Screening
Included
Records screened
(n =263)
Records excluded**
(n = 211)
Reports sought for retrieval
(n =52)
Reports not retrieved
(n =2)
Reports assessed for eligibility
(n = 50)
Reports excluded:
Systematic review (n =12)
Full text not available (n = 11)
Not in English (n=21)
Studies included in review
(n = 12)





Risk of bias was assessed qualitatively concerning selection bias (sequence generation and allocation sequence concealment), performance bias (blinding of participants and personnel), detection bias (blinding of outcome assessment), extent of loss to follow-up, reporting bias (selective outcome reporting), and other bias (e.g., imbalance in baseline characteristics). We used the Cochrane Collaboration's tool for assessing risk of bias and information on assessment were derived from the text .

RESULT

There were sixty patients in the Lira et al. research.The patients were staged clinically from cT1N0M0 to cT4N2cM0. 43 individuals had a traditional procedure, whereas 17 patients received a retroauricular route for 11 endoscopically assisted and 6 robotically assisted SNDs.43 participants were submitted for a conventional SND using a routine procedure; 27 (62.8%) of these patients were male. The patient had an average age of 58 (range 29–85) and a mean BMI of 24.3 kg/m2 (range 18–40) at the time of diagnosis.Squamous cell carcinoma (SCC) was the diagnosis made in each case. By using the usual method, fifteen instances (34.9%) underwent bilateral neck dissections, yielding 58 SNDs in total: 18 contained levels I–IV, 12 included levels I–IIa–III (sparing level IIb), and 28 included levels I–III. 38 patients (88%) had the SND after the main tumor was therapeutically removed, and 27 patients (62.8%) had the SND after a reconstructive treatment (two regional flaps and 25 free vascularized flaps).Taking into consideration the preoperative and postoperative treatment outcomes, the mean total surgical time, including initial tumor removal and repair, was 482 minutes (range 90–870). Eight patients (18.6%) received a blood transfusion at the time of hospital admission, and thirty-four patients (79.1%) were brought to the intensive care unit (ICU) on the first postoperative day after surgery (all eight underwent reconstructive procedures). The drainage period had a duration of 3–16 days, with an average of 8 days.

Twenty-one patients (48.8%) had two cervical hematomas and sixteen infections as local postoperative complications in the neck area. One systemic problem was refractory sepsis associated with pneumonia. Three patients (7.0%) underwent re-intervention during the postoperative period. An average of 14.3 days (range 2–49) were spent in the hospital over the whole stay.

These outcome measures were compared after the need for any type of distant or regional reconstructive flap operation was determined. All major outcome variables demonstrated statistically significant worse outcomes for patients who received reconstructive therapies, with the exception of reoperation.

In the Sannikorn et al. study, there was no statistically significant difference between the two groups' mean total number of excised lymph nodes (23.00±19.04 vs. 23.12±10.30; p = 0.985). The results of the endoscopic assisted retro-auricular approach were not substantially different from the control group (428.00±150.09 vs. 404.17±129.40; p = 0.60), although needing a longer operating time than the standard treatment.

In the study by Shah et al., between April 2017 and June 2018, 80 neck dissections involving 72 patients were performed; 32 (44.5%) of these were performed using the classic single transverse skin crease neck incision, and 40 (55.5%) by the retroauricular (RA) approach. For a total of 48 neck dissections, eight patients had their necks dissected using an open method on both sides. Between the ages of 22 and 85, the mean age for the RA group was 48.9 years, whereas the open group's mean age was 49.8 years. Male participants made up 91% of the group. The majority tumor site in 32 cases (44.5%) was the GB complex, followed by the anterior 2/3 tongue in 20 cases (28%), the upper and lower alveoli in 9 cases (12.5%), and the lip in 5 cases (7%).GB complex accounted for 32 cases (44.5%), anterior 2/3 tongue in 20, 28%, alveolus (upper and lower) in 9, 12.5%, lip in 5, 4%, floor mouth in 2, 2.7%, and palate in 1 case (1.3%). The buccal mucosa was the primary site of the tumors. Clinically N0 instances included 31 out of 32 cases in the RA approach and 41 out of 48 cases in the open approach. The occult metastatic rate was 7.75 percent (7/80). There were no open surgical conversions or significant intraoperative issues following any neck dissection performed with the RA or MFL approach.

For either group, there was no independent documentation of the flap raising and closing times. On the other hand, the mean operating time for the RA group and open group was 97 minutes vs 78 minutes, and the estimated blood loss was 176 milliliters compared 131 milliliters, respectively. The mean duration of ICU and hospital stays (6 days vs. 7 days) was not significantly different between the two groups. In the open group, re-exploration was done on two patients (one for a neck hematoma), while in the endoscopic group, it was done on three patients (three for neck hematomas, one for microvascular free flap congestion).

Forty-eight (83.3%) of the thirty-two in the open group and thirty (93.7%) of the thirty-two in the RA group received selective neck dissection (SND). Thirty-two patients in the RA group and forty-eight patients in the open group, or 93.7% of the patients, had had twenty or more nodes removed. The average nodal yield determined by levels, the average nodal yield determined by neck dissection technique, and the mean number of lymph nodes removed were comparable in both groups. Nodal failure was observed in the ipsilateral neck in two patients in the open group and the contralateral neck in two patients in the RA group. There was not a single case of an ipsilateral nodal recurrence in the RA group.

A cautious approach using needle aspirations was taken for the approximately ten cases of neck seroma or parotid collection that happened in the RA group. Because of bleeding or hematomas, two patients needed to be investigated. A patient with transient voice hoarseness recovered in three months after getting speech therapy.

Nerve weakening was mild in seven cases. There was one patient with flap loss, flap congestion, and flap dehiscence. A conservative approach was taken with five individuals who had partial necrosis of the skin margin. Scar enlargement was evident in five of the participants. None of the lower neck, mandibular body, or preauricular area had any occurrences of skin flap necrosis brought on by extension. In the open group, five cases of parotid collection or neck seroma were discovered. It was necessary to look into four instances of bleeding or hematoma in the neck. A slight weakening was observed in eight of the cases. Two cases of wound dehiscence and one case of flap loss were documented. Shoulder dysfunction has not been identified in detail in either group. Despite the gentle manipulation of the spinal accessory nerve, we observed subjective shoulder dysfunction (restriction in the range of motion beyond the shoulder level) in both groups. Intensive postoperative physiotherapy helped to resolve this over the course of three months.

Ten subjects and eleven necks underwent robot-assisted neck dissection between November 2012 and December 2014. One female and five male volunteers each received ipsilateral and contralateral RAND twice. Body mass index (BMI) ranged from 22.0 to 32.7, and the average age was 56.0 years. The tonsils (5), base of the tongue (2), oral tongue (3), and epiglottis (1) were the tumor's main sites. Every primary tumor was categorized as either T1 or T2. Five of the patients had recognized neck issues prior to having their necks removed. A recurrence of the disease required surgery in two of the five patients who had received radiation therapy to the cervical nodal basins.

Depending on the primary's location, several nodal levels were divided. Eight patients had levels II–IV dissected, two patients had levels I–IV, and one patient had levels I–III.Half of the patients had unilateral RAND alone, while the other five also had unilateral RAND plus an alternative procedure, including a partial glossectomy × 3, a TORS tonsillectomy, or a base of tongue resection.

One patient who had undergone radiation treatment had to donate their internal jugular vein and spinal accessory nerve because to disease involvement. At this stage of the procedure, direct visualization was applied. While the distal vein was managed directly under visual inspection, the proximal vein was managed using an articulating stapler, vascular load, and suture oversewing of the vein assisted by the operating robot.

The mean surgery duration, accounting for extra procedures, was 284.4 ± 72.3 minutes. The mean duration of surgery for patients undergoing neck dissection on their own was 228.7 ± 41.3 minutes. During isolated neck dissection, patients with N0 necks needed less time (179.5 minutes) during surgery than patients with clinical loco regional illness (253.3 minutes). A total of 28.5 ± 9.3 nodes were retrieved on average per neck dissection. Six instances had positive nodes on persistent pathology. Blood loss was 85.5 mL on average. Following surgery, every patient had a Jackson-Pratt drain left in situ. A total of 102.3 ± 47.2 mL was the average outflow. There was no documentation of one patient's drainage output. On the first or second postoperative day following surgery, patients may be discharged.

The one issue that arose during the procedure concerned an inadvertent internal jugular venotomy in one of the patients, which was primarily resolved on the spot with the robot.

Two patients developed shoulder soreness after surgery, which was relieved by physical therapy. The patient's accessory nerve was sacrificed as a result of his participation in the illness. In addition to submental lymphedema, which resolved by his three-month follow-up appointment, the same patient also experienced a small seroma that was drained in-office and did not come back. Packing and oral antibiotics were used to treat a patient who had dehiscence in their wound infection. Chyle leaks and other serious postoperative issues were not observed. Two patients received adjuvant radiation treatment.Of the ten patients who had appropriate follow-up, the average follow-up length was 19.4 months (range: 9–24 months). One locoregional recurrence happened to these patients. This occurred in the supraclavicular region, away from the original operative field, ten months following the initial procedure. The patient had previously undergone radiation treatment for squamous cell carcinoma of the epiglottis. He had a second conventional neck dissection six months after his last operation, and he is now disease-free. There had been no recurrences in the vicinity or beyond. The research conducted by Poma S et al. found that patients undergoing neck dissection using the robotic transaxillary approach had an estimated average surgery time of 166 minutes; the drainage was usually removed after the sixth day, and the patients had an average blood collection of 108 milliliters and an average hospital stay of 6.4 days. Long- or medium-term postoperative complications were not observed. By adopting the robotic retroauricular approach, the neck dissection was completed in an average of 153 minutes; the patients were kept in the hospital for four days after the drainage was removed, with an average collection of 62 milliliters. In the same way, no recorded postoperative issues existed.

DISCUSSION

This study aimed to examine the feasibility of robotic and endoscopic assisted selective neck dissection. Using this approach is currently off-label because the FDA has not approved this indication yet. The data in English literature is scant and primarily derived from a single department that reports on encounters with Asians; it is only utilized in a small number of departments globally.

Europe and North America's contributions are less significant. It is noteworthy that the applicability of these novel techniques may be limited by population demographics due to anatomical restrictions. Consequently, this work adds significant knowledge to the field of neck surgery employing remote access and minimally invasive procedures by providing data on the initial cohort from a single Latin American institute.

The 1980s saw the beginning of the development of less intrusive surgical techniques, and surgical robotics came about in 1985. With its enhanced, brightly lighted operating vision, the surgeon can identify anatomy more easily, perform a precise surgical dissection, and remove the tumor entirely. Parathyroidectomies were the first head and neck surgical procedures performed with full endoscopic assistance (Gagner, 1997). Many studies on endoscopic and video-assisted procedures have been carried out. Nonetheless, since the da Vinci surgical implementation robot addresses a number of endoscopic process faults, the focus of current research has shifted increasingly toward this technique. A limited range of motion is one of the disadvantages of these endoscopic surgeries.

The current study's results are consistent with previous research when comparing the robotic and endoscopic-assisted technique to traditional neck dissection. No appreciable variation in perioperative or postoperative complications (such as seroma, hematoma, or surgical site infection) associated with approach or surgical technique was observed in our group. The significant neurovascular systems were always intact in the retroauricular group, and there was no conversion to open surgery or extended hospital stay. When compared to both the prior published studies and the usual procedures, the incidence of low-grade marginal nerve paresis was deemed acceptable.

Although there is still work to be done on developing a treatment for SND using a retroauricular method that combines endoscopic and robotic assistance, it is important to think about potential advancements in current practice and seize any opportunities that come with new technology. This would include developing more versatile, smaller tools that may facilitate the process. Confirming the surgical site and providing feedback on whether adequate tumor resection margins were reached would both greatly benefit from the incorporation of image guided navigation techniques. The da Vinci Si can already be interfaced with the Medtronic (Minneapolis, MN, USA) navigational unit through the use of TileproTM multi-input display software.

The current cohort under examination did not encounter any of the predicted side effects, such as cervical postrhytidectomy contracture, auricular deformity, or auricular nerve paresthesia, that opponents of the retroauricular procedure had mentioned. The marginal branch can be correctly viewed and dissected using the retroauricular approach without encountering any major technical challenges. However, thermal damage and skin traction should be considered as possible dangers to this nerve during robotic or endoscopic dissection.

Its long recovery period remains the main downside of the retroauricular procedure, mostly due to the labor-intensive elevation of the sub platysma flap and formation of the working space. This analysis confirmed the trend of a discernible reduction in surgical time from the initial patient to the final one. Every new technology has an initial learning curve and an adjustment period. Experience with the retroauricular procedure under direct visualization has shown that most neck levels, especially levels II and III, can also be operated on using this technique. Limiting robotic and endoscopic assistance to complete the dissection in the most difficult-to-reach areas could further cut down on operating time.

CONCLUSION

This retrospective study on the early experience of endoscopic and robotic SND using the retroauricular method has shown that this approach is feasible, safe, and oncologically effective when compared to conventional surgery. It is applicable in specific circumstances and offers a certain cosmetic advantage. Departments without access to the technology of the da Vinci surgical robot can nonetheless accomplish similar cosmetic results with endoscopic operations. To clarify the advantages, improve the process of selecting cases, and evaluate costs, functional outcome, patient satisfaction, and learning curve, more prospective research in a larger number of cases is obviously necessary.

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