Operative Techniques in Otolaryngology 34 (2023) e42–e50

Operative Techniques in Otolaryngology

Outcomes of the facelift incisional approach to neck dissection without endoscopic or robotic assistance ☆

Benjamin T. Ostrander, MD, MSE[a,b], Matthew N. Harmon, MD[a], Vanessa K. Yu, BS[a], Joseph Califano, MD[a,b]

From the [a]Department of Otolaryngology – Head and Neck Surgery, University of California San Diego Health, San Diego, California
[b]Moores Cancer Center, University of California San Diego Health, La Jolla, California

KEYWORDS
Head and neck surgery;
Head and neck cancer;
Neck dissection;
Facelift

The facelift incisional approach to neck dissection offers several advantages including improved cosmesis, increased patient satisfaction, and decreased morbidity. This approach has been previously described using robotic or endoscopic instrumentation, but the clinical outcomes of this approach using standard instrumentation have not been reported. The objective of this study was to determine if the facelift incisional approach to neck dissection can be performed without endoscopic or robotic assistance and achieve improved oncologic and cosmetic outcomes. This was a retrospective cohort study over 4 years at a national comprehensive cancer center. A total of 104 subjects received 113 oncologic neck dissections, of which 35 were performed using a facelift approach. Primary outcomes included rate of negative margins, recurrence, incidence of nerve weakness, and incidence of lymphedema. The mean age of the cohort was 60.1 ± 12.7 years and 72.6% were male. Mean follow up was 23.1 ± 19.1 months ($P = 0.21$). The 104 subjects (92.9%) had negative margins on final pathology, with no difference between approaches (88.2% vs 94.9% respectively, $P = 0.24$). Thirty-four subjects (97.1%) in the facelift group had no evidence of disease at study conclusion. There was no difference in marginal mandibular nerve weakness ($P = 0.10$) nor shoulder weakness ($P = 0.59$) between groups. There was no difference between postoperative lymphedema (38.2% vs 29.2% for the facelift vs standard incision groups, $P = 0.35$). A facelift approach to neck dissection using standard instrumentation without robotic or endoscopic assistance achieves acceptable clinical and oncologic outcomes compared to the standard incisional approach with an additional benefit of improved cosmesis.

© 2023 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)

☆ Funding: The authors have no funding.

Address reprint requests and correspondence: Benjamin T. Ostrander, MD, MSE, Department of Otolaryngology-Head and Neck Surgery, University of California, San Diego, 3855 Health Sciences Dr., MC 0803, La Jolla, CA 92037-0803.
E-mail address: bostrander@health.ucsd.edu

http://doi.org/10.1016/j.otot.2023.02.001
1043-1810/© 2023 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)

Introduction

Lymph node metastasis reduces the survival rate of patients with squamous cell carcinoma by half, and thus either elective or therapeutic excision of cervical lymph nodes remains a central tenant in the management of head and neck malignancy.[1,2] Over the last several decades, advances in the understanding of cervical fascial planes, lymphatic drainage patterns, preoperative staging, and extracapsular spread have led to a shift in neck dissection technique, with preservation of nonlymphatic structures and targeted dissections of specific nodal groups at risk for metastatic disease based on the size, location, and other features of the primary tumor.[3] As a result, head and neck cancers can be treated with significantly less morbidity but equivalent survival outcomes. Patients undergoing neck dissection today are less likely to suffer from long term sequalae including muscle and nerve dysfunction, dysphagia, shoulder weakness, and lymphedema.

In tandem with these advances, surgical approaches have become increasingly minimally invasive or have been accomplished through "scarless" approaches which utilize natural orifices or limited incisions in cosmetically concealed locations. The need for improved cosmetic and functional outcomes has become increasingly emphasized, with the recognition that effective oncologic control does not always require more radical or invasive treatments.[4] Performing lower morbidity oncologic surgery has also become more relevant over the last several decades with the increasing incidence of younger, healthier individuals with human papillomavirus-mediated squamous cell carcinoma. A subset of these patients with cN0 disease without clinically evident nodal metastasis will undergo elective neck dissection, necessitating a separate cervical incision when the primary tumor is resected transorally, as is often the case with current techniques.[5]

The development of minimally invasive or cosmetically favorable techniques has been greatly accelerated by advances in endoscopic and robotic technologies. These newer approaches offer the potential for reduced healing time, less scarring, shorter hospital stays, improved cosmetic outcomes, and reduced surgical morbidity.[6,7] Various remote access neck operations via axillary, breast, anterior chest, postauricular facelift, or transoral approaches with or without the assistance of surgical robots or endoscopy have been developed for thyroid, parathyroid, submandibular, and neck masses to avoid visible neck scars.[1,4,5,7–19]

While novel remote access neck approaches were first applied to endocrine surgery, trans-axillary and retroauricular, modified facelift and postauricular approaches have been developed specifically for neck dissection, with initial efforts focused on selective neck dissection and then expanded to comprehensive modified radical neck dissection.[1,4,5,13,15,16,18] These have reported at minimum subjectively better cosmetic outcomes and higher patient satisfaction with reduced incisional scarring. Importantly, not all of these approaches are "minimally invasive," since they may actually require more soft tissue dissection, CO_2 insufflation, increased postoperative pain, and/or longer operative times.[4]

Despite these advances in technique, oncologic neck dissection continues to be performed largely through standard anterolateral cervical skin incisions. Head and neck surgeons are frequently faced with the difficulty of prioritizing and balancing oncologic control, functional results, quality of life, and cosmetic outcomes in treating patients. Moreover, the additional time, complexity, skill, and expense associated with robotic approaches hampers wide adoption. Whereas virtually all previously described techniques utilizing modified facelift or retro-auricular incisional approaches have required the assistance of robotics or endoscopes, herein we present the outcomes for minimally invasive, cosmetically favorable oncologic neck dissection through a facelift approach which does not require endoscopic or robotic assistance. Clinical and oncologic outcomes between novel facelift neck dissection (FLND) and conventional neck dissection approaches are compared.

Methods

Approval for this retrospective cohort study was obtained from the University of California San Diego Institutional Review Board. All neck dissections performed by the senior author from January 2016 to December 2020 were queried by CPT code and reviewed in the electronic medical record. Total 113 cases with 35 facelift incisional approaches were reviewed. Subjects with insufficient clinical data or those who underwent neck dissection for thyroid cancer were excluded. Subjects with intentional nerve sacrifice or pre-existing nerve or musculoskeletal dysfunction were excluded from the analysis of complications. Demographic data, past medical history, clinical history, operative details, postoperative course, and outpatient follow up were reviewed in detail.

Patients who underwent facelift incision were selected considering patient preference and at the surgeon's discretion based on extent of disease and preoperative status. A subset of randomly selected patients who underwent a standard approach to neck dissection were included as controls.

The operative technique was similar to our previously described approach.[4] Patients were positioned, prepped, and draped in the usual sterile fashion. A facelift incision was marked from the anterior border of the tragus, around the lobule, extending postauricular and 4-5 cm inferiorly along the hairline. After injection with local anesthesia, the incision was made and skin and subplatysmal flaps were raised. Appropriate neural and vascular structures were preserved. Lymph node levels were removed in a modular fashion, and levels II and III were removed separately to facilitate subsequent access to levels I, IV, and V as needed.

Dissection under extended skin flaps was performed using a lighted breast retractor and extended length guarded electrocautery tip. The General Thompson retractor system

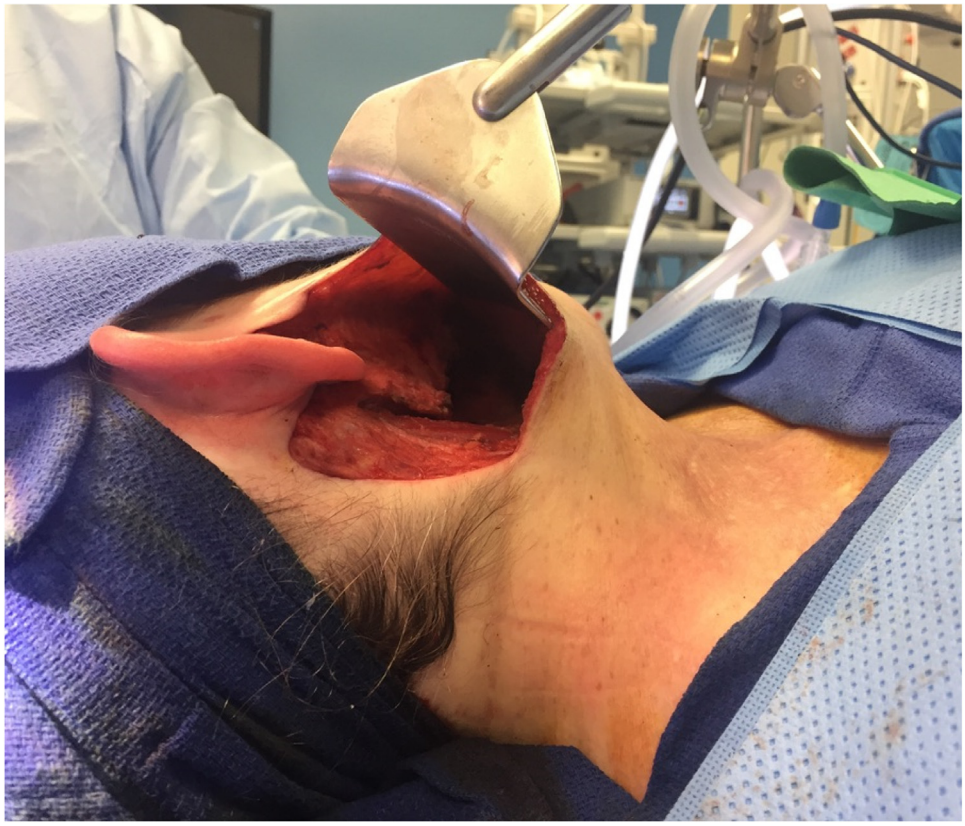

Figure 1 Example of a postauricular modified facelift incisional approach to neck dissection, with an extended subplatysmal flap. Retraction is facilitated by the General Thompson retractor system, which allows for improved access while not requiring a surgical assistant to perform arduous retraction and freeing his or her hands for other tasks.

with Thompson ultra-blades were frequently used for exposure and provided static retraction which was especially useful in the dissection of levels I and IV (Figure 1). These levels, most distant from the incision, were the most difficult to dissect using the facelift approach but were still accessible with proper retraction and lighting. Robotic and/or endoscopic instrumentation was not required and was not used. Jackson–Pratt drains were placed in all cases and removed 2-5 days postoperatively after meeting the criteria of <20 cc per 24-hour period. The skin was closed using cyanoacrylate tissue adhesive.

Statistical analysis was performed using Stata statistical software (StataCorp LLC, College Station, Texas) using Student's *t*-test for continuous variables, Pearson's chi-squared for categorical variables, and the Fisher's exact test for categorical variables with small sample size, with significance defined as $P < 0.05$.

Results

There were 35 neck dissections via the facelift incisional approach and 78 neck dissections using a standard incisional approach. The mean age of the cohort was 60.1 ± 12.7 years and 72.6% were male. There were a lower proportion of males in the facelift group (57.1% vs 79.5%, $P = 0.01$). There was no difference in the mean body mass index (27.5 ± 6.3 vs 25.5 ± 5.1 kg/m^2, $P = 0.09$) or distribution of race ($P = 0.84$) between groups, although 73.5% of subjects in the cohort were Caucasian. Fifty-nine subjects (52.2%) had a significant smoking history and 11.5% had a history of excessive alcohol intake, with no difference between groups ($P = 0.18$ and $P = 0.75$, respectively). Most subjects had either oral cavity or oropharynx squamous cell carcinoma (33.6% and 25.7%, respectively) with no difference in the distribution of primary site between groups ($P = 0.16$). Cancer diagnosis within the cohort spanned a variety of subsites and included other malignancies including melanoma, teratoma, and minor salivary gland cancers.

There was a balanced distribution of clinical stages among the entire cohort (Stage I 19.5%, Stage II 25.7%, Stage III 19.5%, stage IV 33.6%), and there was no significant difference in distribution of stages between groups ($P = 0.21$). There was a nonsignificant trend towards subjects with higher clinical and pathologic stages receiving a standard neck dissection ($P = 0.21$, $P = 0.09$ respectively). Sixty-one subjects (54.0%) had clinically N0 neck disease, followed by 30 subjects (26.5%) with clinically N2 disease and 17 subjects (15.0%) with clinically N1 disease. The distribution of clinical nodal disease was comparable between groups ($P = 0.56$), and those with N3, NX, or missing clinical nodal stage were uncommon. The details of the demographic characteristics for the cohort are detailed in Table 1.

Table 1 Demographic characteristics of the facelift and standard incision neck dissection groups.

Demographics	Total neck dissections (n = 113)	Facelift neck dissections (n = 35)	Standard neck dissections (n = 78)	*P* value
Age	60.1 ± 12.7	57.9 ± 14.3	61.1 ± 11.8	$P = 0.21$ (*t* test)
Male sex	82 (72.6%)	20 (57.1%)	62 (79.5%)	**$P = 0.01$ ($\chi 2$)**
BMI	26.1 ± 5.6	27.5 ± 6.3	25.5 ± 5.1	$P = 0.09$ (*t* test)
Race				
Caucasian	83 (73.5%)	26 (31.3%)	57 (68.7%)	$P = 0.84$ (Fisher's)
Black/African American	2 (1.8%)	0 (0%)	2 (100%)	
American Indian	1 (0.9%)	0 (0%)	1 (100%)	
Asian/Pacific Islander		2 (22.2%)	7 (77.8%)	
Mixed/other	18 (15.9%)	7 (38.9%)	11 (61.1%)	
Smoking	59 (52.2%)	15 (42.9%)	44 (56.4%)	$P = 0.18$ ($\chi 2$)
EtOH abuse	13 (11.5%)	3 (8.6%)	10 (12.8%)	$P = 0.75$ (Fisher's)
Co-morbidities				
HTN	58 (51.3%)	17 (48.6%)	41 (52.6%)	$P = 0.70$ ($\chi 2$)
DM	21 (18.6%)	5 (14.3%)	16 (20.5%)	$P = 0.43$ ($\chi 2$)
CHF	5 (4.4%)	1 (2.9%)	4 (5.1%)	$P = 0.10$ (Fisher's)
CAD	14 (12.4%)	6 (17.1%)	8 (10.3%)	$P = 0.30$ ($\chi 2$)
COPD/asthma	15 (13.3%)	3 (8.6%)	12 (15.4%)	$P = 0.39$ (Fisher's)
OSA	13 (11.5%)	2 (5.7%)	11 (14.1%)	$P = 0.34$ (Fisher's)
Stroke	15 (13.3%)	3 (8.6%)	12 (15.4%)	$P = 0.39$ (Fisher's)
Neo-adjuvant therapy	34 (30.1%)	7 (20.0%)	27 (34.6%)	$P = 0.12$ ($\chi 2$)
Diagnosis				
SCC OC	38 (33.6%)	11 (31.4%)	27 (34.6%)	$P = 0.16$ (Fisher's)
SCC OP	29 (25.7%)	8 (22.9%)	21 (26.9%)	
SCC hypophyx	3 (2.6%)	0 (0%)	3 (3.9%)	
SCC larynx	7 (6.2%)	0 (0%)	7 (9.0%)	
SCC skin	10 (8.9%)	3 (8.6%)	7 (9.0%)	
SCC parotid	4 (3.5%)	3 (8.6%)	1 (1.3%)	
Melanoma	7 (6.2%)	2 (5.7%)	5 (6.4%)	
Salivary cancers	11 (9.7%)	6 (17.1%)	5 (6.4%)	
Other	4 (3.5%)	2 (5.7%)	2 (2.6%)	
Stage Clinical				$P = 0.21$ ($\chi 2$)
Stage I	22 (19.5%)	9 (25.7%)	13 (16.7%)	
Stage II	29 (25.7%)	11 (31.4%)	18 (23.1%)	
Stage III	22 (19.5%)	7 (20.0%)	15 (19.2%)	
Stage IV	38 (33.6%)	7 (20.0%)	31 (39.7%)	
Missing	2 (1.8%)	1 (1.3%)	1 (1.3%)	
Nodal Stage Clinical				
N0	61 (54.0%)	22 (62.9%)	39 (50%)	$P = 0.56$ (Fisher's)
N1	17 (15.0%)	4 (11.4%)	13 (16.7%)	
N2	30 (26.5%)	7 (20.0%)	23 (29.5%)	
N3	2 (1.8%)	1 (2.9%)	1 (1.3%)	
NX	1 (0.9%)	0 (0%)	1 (1.3%)	
Missing	2 (1.8%)	1 (2.9%)	1 (1.8%)	

Details of operative and immediate postoperative course are detailed in Table 2. Case duration was longer in the facelift group (598.3 ± 374.4 vs 460.3 ± 312.4 minutes, $P = 0.001$). A broad variety of neck dissection levels were represented, with the extent of neck dissection dictated by the primary surgeon based on characteristics of the primary tumor and established clinical guidelines. In total, there were 32 level I-V neck dissections (28.3%), 26 level II-IV neck dissections (23.0%), and 26 level I-III neck dissections (23.0%), with other combinations of levels being less common. Level I-III neck dissections were more common in the facelift group (45.7% vs 12.8%), and level I-V and II-IV neck dissections were more common in the standard group (30.8% vs 22.9% and 25.6% vs 17.1%, respectively). As a result, there was a significant difference in the distribution of overall neck dissection levels between groups ($P = 0.02$). Only 1 bilateral neck dissection was performed using the facelift approach (2.9% vs 17.9%, $P = 0.03$). Length of stay was shorter in the facelift group (2.1 ± 2.0 vs 4.7 ± 4.6 days, $P = 0.002$). A higher proportion of subjects in the cohort were pathologic stage IV (46 subjects, 40.7%), and Stage IV pathologic disease was more common in the standard approach group (50.0% vs 20.0%). However, the overall distribution of pathologic

Table 2 Operative outcomes of the facelift and standard neck dissection groups.

Outcomes	Total neck dissections (n = 113)	Facelift neck dissections (n = 35)	Standard neck dissections (n = 78)	*P* value
Case length (min)	460.3 ± 312.4	598.3 ± 374.4	398.4 ± 259.9	**$P = 0.0014$ (*t* test)**
Levels dissected				
I-III	26 (23.0%)	16 (45.7%)	10 (12.8%)	**$P = 0.02$ (Fisher's)**
I-IV	10 (8.8%)	1 (2.9%)	9 (11.5%)	
I-V	32 (28.3%)	8 (22.9%)	24 (30.8%)	
II-IV	26 (32.0%)	6 (17.1%)	20 (25.6%)	
II-V	10 (8.9%)	3 (8.6%)	7 (9.0%)	
Other	9 (8.0%)	1 (2.9%)	8 (8.9%)	
Laterality				
Left	42 (37.1%)	18 (51.4%)	24 (30.8%)	**$P = 0.03$ ($\chi 2$)**
Right	56 (49.6%)	16 (45.7%)	40 (51.3%)	
Bilateral	15 (13.3%)	1 (2.9%)	14 (17.9%)	
Pathologic stage				
Stage I	22 (19.5%)	8 (22.9%)	14 (17.9%)	**$P = 0.09$ ($\chi 2$)**
Stage II	19 (16.8%)	8 (22.9%)	11 (14.1%)	
Stage III	18 (15.9%)	5 (14.3%)	13 (16.7%)	
Stage IV	46 (40.7%)	7 (20.0%)	39 (50.0%)	
Missing	8 (7.1%)	7 (20%)	1 (1.3%)	
Extranodal extension	25 (22.1%)	5 (14.3%)	20 (25.6%)	$P = 0.18$ ($\chi 2$)
Positive nodes	2.0 ± 3.9	1.6 ± 4.7	2.2 ± 3.5	$P = 0.44$ (*t* test)
Total nodes	34.7 ± 18.6	31.5 ± 12.0	36.1 ± 20.8	$P = 0.22$ (*t* test)
Length of stay (days)	3.9 ± 4.1	2.1 ± 2.0	4.7 ± 4.6	**$P = 0.002$ (*t* test)**

stages was not significantly different between groups ($P = 0.09$). Mean positive node count was 1.6 ± 4.7 in the facelift group and 2.2 ± 3.5 in the standard group and mean total node count was 31.5 ± 12.0 in the facelift group and 36.1 ± 20.8 in the standard group ($P = 0.44$, $P = 0.22$ respectively). Extranodal extension (ENE) as documented on final surgical pathology was more common in the standard incision group, but this was not significant (25.6% vs 14.3%, $P = 0.18$). Length of stay was significantly shorter in the facelift group (2.1 ± 2.0 vs 4.7 ± 4.6 days, $P = 0.002$).

Postoperative outcomes and complications are presented in Table 3. Mean follow up was 23.1 ± 19.1 months ($P = 0.21$). Seventy-one subjects (62.8%) received adjuvant radiation. Forty-five subjects (39.8%) received postoperative adjuvant chemotherapy, with more subjects in the standard incision group receiving chemotherapy (48.7% vs 20.0%, $P = 0.004$). Total 104 subjects (92.9%) had negative margins on final pathology (88.2% vs 94.9% facelift vs standard groups, $P = 0.24$). In the facelift group, one subject had an out of field nodal recurrence in the ipsilateral neck that was managed with surgery and radiation with no evidence of recurrent disease, and 1 subject had multiple recurrences in the contralateral neck. Thirty-four subjects (97.1%) in the facelift group had no evidence of disease at study conclusion.

There was no difference between incidence of postoperative lymphedema (38.2% vs 29.2% for the facelift compared to standard incision groups, $P = 0.35$) nor in subjects who pursued lymphedema occupational therapy (44.1% vs 30.6% for the facelift vs standard incision groups, $P = 0.17$). There was no difference in marginal mandibular nerve weakness ($P = 0.10$) nor shoulder weakness ($P = 0.59$) between groups. Two subjects in each group had transient shoulder weakness that resolved, and 2 subjects in the facelift group had transient marginal mandibular nerve weakness that resolved. Five subjects had intentional marginal mandibular nerve sacrifice due to tumor involvement. Two had primary neurorrhaphy of which 1 had complete recovery and 1 had partial recovery of nerve function. One subject had delayed static facial reconstruction with tensor fascia lata static suspension and eyelid weight. Two subjects had intentional spinal accessory nerve sacrifice due to tumor involvement. One subject had greater auricular nerve interposition graft but was not followed for sufficient time to query recovery of function. One subject had pre-existing shoulder dysfunction prior to surgery. Two subjects had poor mobility due to adhesive capsulitis, which was not considered nerve weakness. These subjects were excluded from the analysis of postoperative complications, as reflected in the number of subjects included in Table 3. Hematoma (5.0%), infection (3.8%), and salivary fistula (3.0%) were the most common complications, and all occurred at low rates.

Discussion

This study presents a review of 35 minimally invasive, cosmetically favorable oncologic neck dissections through a facelift approach, without the assistance of endoscopic or robotic instrumentation. Subjects who underwent a facelift

Table 3 Summary of postoperative complications comparing the facelift and standard incision neck dissection groups.

Postoperative complications	Total subjects (n = 99)*	Facelift neck dissections (n = 31)	Standard neck dissections (n = 68)	*P* value
Length of follow up (months)	23.1 ± 19.1	19.7 ± 19.8	24.6 ± 18.7	$P = 0.21$ (*t* test)
Adjuvant chemotherapy	45 (39.8%)	7 (20.0%)	38 (48.7%)	**$P = 0.004$ ($\chi 2$)**
Adjuvant radiation	71 (62.8%)	22 (62.9%)	49 (62.8%)	$P = 1.0$ ($\chi 2$)
Negative margins	104 (92.9%)	30 (88.2%)	74 (94.9%)	$P = 0.24$ (Fisher's)
Recurrence		2 (5.7%)		
Nerve outcomes				
Marg weakness - persistent	0 (0%)	0 (0%)	0 (0%)	$P = 0.10$ (Fisher's)
Marg weakness - temporary	2 (2.0%)	2 (6.4%)	0 (0%)	
Shoulder weakness - persistent	0 (0%)	0 (0%)	0 (0%)	$P = 0.59$ (Fisher's)
Shoulder weakness - temporary	4 (4.0%)	2 (6.4%)	2 (2.9%)	
Adverse events				
Hematoma/bleeding	5 (5.0%)	1 (3.2%)	4 (5.9%)	$P = 0.94$ (Fisher's)
Infection	4 (3.8%)	1 (3.2%)	2 (2.9%)	
Salivary fistula	3 (3.0%))	0 (0%)	3 (4.4%)	
Flap thrombosis	2 (2.0%)	0 (0%)	2 (2.9%)	
Other	3 (3.0%)	1 (3.2%)	2 (2.9%)	
	Total subjects (n=106)†	Facelift neck dissections (n=34)	Standard neck dissections (n=72)	*P* value
Lymphedema	34 (32.1%)	13 (38.2%)	21 (29.2%)	$P = 0.35$ ($\chi 2$)
Lymphedema OT	37 (34.9%)	15 (44.1%)	22 (30.6%)	$P = 0.17$ ($\chi 2$)

* Subjects with intentional nerve sacrifice due to tumor involvement, pre-existing shoulder or facial weakness, or adhesive capsulitis were not included in the analysis of postoperative complications, as reflected in the total number of subjects included in the table.

† Seven subjects received multiple neck dissections and only the primary surgery was considered for analysis of postoperative complications and lymphedema.

neck dissection had equivalent oncologic outcomes, including no difference in rate of negative margins (88.2% vs 94.9% respectively, $P = 0.24$) and mean positive and mean total node counts ($P = 0.44$, $P = 0.22$ respectively). A total of 97.1% subjects in the facelift group had no evidence of disease at study conclusion, with one out of field recurrence. Additionally, there was not a higher incidence of postoperative complications in the facelift group, including no difference in marginal mandibular nerve weakness ($P = 0.10$) nor shoulder weakness ($P = 0.59$) between groups. Other complications, including hematoma, infection, and salivary fistula were very low (under 5%) and not different between groups ($P = 0.94$). Hematoma is the most common complication after rhytidectomy, however there was not a higher rate of hematoma in the facelift incision group compared to the standard incision group.[20]

It was hypothesized that the facelift approach may reduce the incidence and severity of postoperative lymphedema, given the posterior hairline incision avoids lymphatic channels located in the subcutaneous tissue of the anterolateral neck, which are violated in the standard approach. While our results did not show a lower incidence of lymphedema among the facelift group (38.2% vs 29.2% for the facelift vs standard incision groups, $P = 0.35$), there was no significant difference in lymphedema between groups nor in those who pursued lymphedema occupational therapy (44.1% vs 30.6% for the facelift vs standard incision groups, $P = 0.17$). It should be noted that the lymphedema outcome measure was recorded based on a gross subjective assessment in clinic follow up notes. Unfortunately, a more objective metric or validated questionnaire for lymphedema was not available retrospectively.

In addition to demonstrating equivalent oncologic outcomes and complications, the facelift group had a shorter hospital length of stay (2.1 ± 2.0 vs 4.7 ± 4.6 days, $P = 0.002$) by approximately 2½ days, which represents significant cost savings. Shorter length of stay also suggests more rapid postoperative recovery and potentially lower morbidity surgery. While case duration was longer in the facelift group (598.3 ± 374.4 vs 460.3 ± 312.4 minutes, $P = 0.001$), this was not adjusted for other

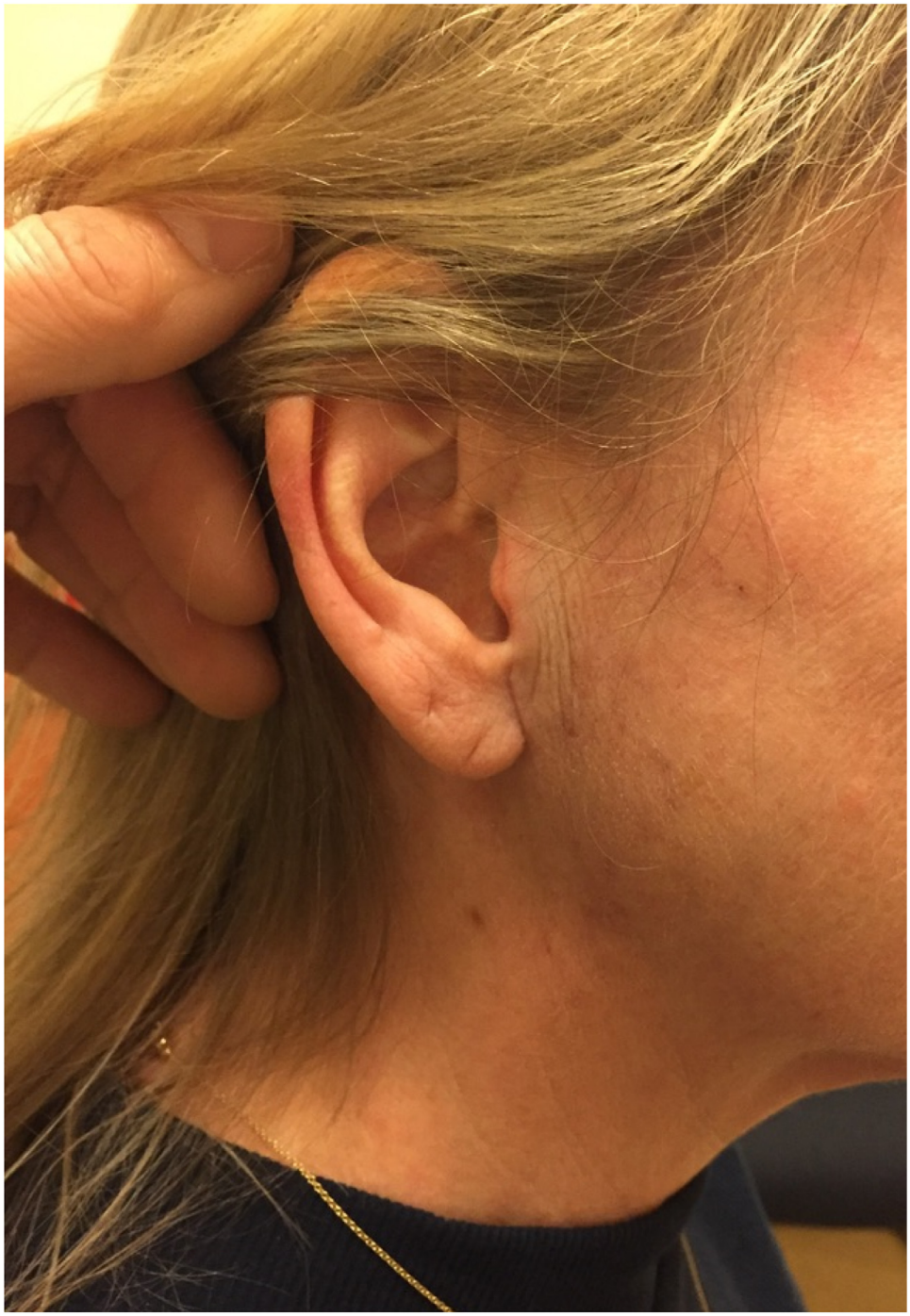

Figure 2 A healed modified facelift incision approximately one month postoperatively. No anterolateral cervical incision is visible on the neck. The incision is largely hidden in the postauricular region and in the hairline. No lymphedema is noted.

procedures performed concurrently with neck dissection, including primary tumor resection and reconstruction. In our experience, the facelift approach does take longer, but once the surgeon gains familiarity and confidence with the technique, the difference in duration is marginal.

A principal benefit of the facelift neck dissection is improved cosmetic outcome compared to a traditional, more visible anterolateral neck incision. The facelift incision reduces the known morbidity of visible neck scarring (Figure 2). This is concordant with a general trend in surgery towards minimally invasive techniques as well as reduction in morbidity associated with treatment. Numerous recent clinical trials have investigated de-escalation of radiotherapy and/or chemotherapy, in particular for HPV-associated oropharyngeal cancer.[21,22] Other work has examined the utility of sentinel lymph node biopsy in lieu of elective neck dissection for head and neck squamous cell carcinoma, which has the potential to reduce overtreatment.[23] In the era of de-escalation of therapies, reduction of cosmetic morbidities associated with neck dissection is

desirable for patients, especially if equivalent oncologic outcomes can be realized.

The facelift neck dissection necessitates several important considerations. Patients undergoing a facelift approach should be appropriately selected. In this cohort, there were a lower proportion of males in the facelift group (57.1% vs 79.5%, $P = 0.01$), suggesting that females may be more sensitive to the cosmetic effects of an anterolateral neck scar and therefore elect for a facelift approach more frequently. Additionally, younger patients may also have similar preferences.

The facelift approach should not be used if there is any doubt about maintaining oncologic control and low complications rates. Patients with particularly long or obese necks make dissection in the supraclavicular and submental regions more challenging using the facelift approach, given the distal location of these regions under extended subplatysmal. Bulky disease in level I or low in level IV can be difficult to manage through this approach.[4] Results showed a trend towards subjects with higher clinical and pathologic stages receiving a standard neck dissection ($P = 0.21$, $P = 0.09$ respectively). Additionally, there was a trend towards more subjects in the standard incision group with ENE (25.6% vs 14.3%, $P = 0.18$) and higher rates of adjuvant chemotherapy (48.7% vs 20.0%, $P = 0.004$), suggesting a preponderance of more aggressive disease. As such, when beginning to deploy the facelift neck dissection technique, it may be useful to select patients undergoing an elective neck dissection for a clinically N0 neck or with limited bulk of nodal disease. Those with bulky nodal disease or clinical or radiographic evidence of ENE may be more appropriate for a standard incisional approach.

A key innovation of this technique is the achievement of a minimally invasive neck dissection without the use of robotic or endoscopic instrumentation. The facelift approach is dependent on additional retraction for adequate exposure. Early work noted difficulty in accessing the most distal levels in the neck dissection, namely, levels IIA and VA, but have since demonstrated feasibility of dissecting these levels through retroauricular or modified facelift incision only.[1,15,24] Lifting a subplatysmal flap can be initiated using traditional methods, but the use of longer instruments, such as the lighted breast retractor and extended tip monopolar electrocautery, are helpful for visualization, illumination, and dissection as the flap lengthens with elevation.[4] The Thompson retractor system also allows for improved access while not requiring a surgical assistant to perform arduous retraction and freeing his or her hands for other tasks (Figure 1). All previously published reports of facelift neck dissection utilize robots or endoscopes to complete the dissection, particularly at levels I and IV. Our experience indicates that these additional tools are not necessary. Moreover, the use of robots and endoscopes significantly prolongs case duration, increases cost, and requires additional familiarity and experience to use.

This study has several limitations. It is a retrospective, single-institution, single-surgeon study, which limits the strength of evidence and the generalizability of the data. The reporting of quantitative and objective postoperative metrics was also limited, with incomplete assessment of immediate postsurgical edema, immediate postoperative pain and numbness, lymphedema, cosmesis, and patient satisfaction. Future studies should incorporate improved quantitative and patient-reported outcome measures for these factors. A prospective, multi-surgeon study in a larger cohort would also strengthen the ability to draw conclusions.

In conclusion, a facelift approach to neck dissection using standard instrumentation without robotic or endoscopic assistance achieves acceptable clinical and oncologic outcomes compared to the standard incisional approach with an additional benefit of improved cosmesis.

Disclosure

The authors reported no proprietary or commercial interest in any product mentioned or concept discussed in this article.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Authors' contributions

Benjamin T. Ostrander: conception, data collection, chart abstraction, analysis, statistics, manuscript preparation including writing and revisions. **Matthew N. Harmon:** data collection, chart abstraction. **Vanessa K. Yu:** data collection, chart abstraction. **Joseph Califano:** conception, data collection, analysis, manuscript preparation, revisions.

References

1. Park YM, Holsinger FC, Kim WS, et al: Robot-assisted selective neck dissection of levels II to V via a modified facelift or retroauricular approach. Otolaryngol Head Neck Surg 148(5):778–785, 2013. doi:10.1177/0194599813478934.
2. D'Cruz AK, Vaish R, Kapre N, et al: Elective versus therapeutic neck dissection in node-negative oral cancer. N Engl J Med 373(6):521–529, 2015. doi:10.1056/NEJMoa1506007.
3. Bocca E, Pignataro O, Oldini C, et al: Functional neck dissection: An evaluation and review of 843 cases. Laryngoscope 94(7):942–945, 1984. doi:10.1288/00005537-198407000-00015.
4. Melvin TA, Eliades SJ, Ha PK, et al: Neck dissection through a facelift incision. Laryngoscope 122(12):2700–2706, 2012. doi:10.1002/lary.23386.
5. Byeon HK, Holsinger FC, Koh YW, et al: Endoscopic supraomohyoid neck dissection via a retroauricular or modified facelift approach: Preliminary results. Head Neck 36(3):425–430, 2014. doi:10.1002/hed.23308.

6. Simaan N, Xu K, Wei W, et al: Design and Integration of a telerobotic system for minimally invasive surgery of the throat. Int J Robot Res 28(9):1134–1153, 2009. doi:10.1177/0278364908104278.
7. Donatini G, Materazzi G, Miccoli P: The endoscopic approach to the neck: A review of the literature and an overview of the various techniques. Surg Endosc 26(1):287, 2012. doi:10.1007/s00464-011-1875-y.
8. Song CM, Jung YH, Sung MW, et al: Endoscopic resection of the submandibular gland via a hairline incision: A new surgical approach. Laryngoscope 120(5):970–974, 2010. doi:10.1002/lary.20865.
9. Tae K, Ji YB, Jeong JH, et al: Robotic thyroidectomy by a gasless unilateral axillo-breast or axillary approach: Our early experiences. Surg Endosc 25(1):221–228, 2011. doi:10.1007/s00464-010-1163-2.
10. Terris DJ, Singer MC, Seybt MW: Robotic facelift thyroidectomy: II. Clinical feasibility and safety. Laryngoscope 121(8):1636–1641, 2011. doi:10.1002/lary.21832.
11. Shin YS, Chung HP, Shin HA, et al: Endoscopic axillo-breast approach for benign neck mass excision. Laryngoscope 122(3):559–564, 2012. doi:10.1002/lary.22462.
12. Arribas-Garcia I, Alcala-Galiano A: Facelift approach for neck dissection in squamous cell carcinoma of the lateral border of the tongue: Application of this novel aesthetic technique in head and neck oncologic surgery. J Craniofac Surg 25(3):1019–1020, 2014. doi:10.1097/SCS.0000000000000730.
13. Greer Albergotti W, Kenneth Byrd J, De Almeida JR, et al: Robot-assisted level II-IV neck dissection through a modified facelift incision: Initial North American experience. Int J Med Robot 10(4):391–396, 2014. doi:10.1002/rcs.1585.
14. Shin YS, Choi EC, Kim CH, et al: Robot-assisted selective neck dissection combined with facelift parotidectomy in parotid cancer. Head Neck 36(4):592–595, 2014. doi:10.1002/hed.23441.
15. Tae K, Ji YB, Song CM, et al: Robotic selective neck dissection by a postauricular facelift approach: Comparison with conventional neck dissection. Otolaryngol Head Neck Surg 150(3):394–400, 2014. doi:10.1177/0194599813515431.
16. Kim WS, Byeon HK, Park YM, et al: Therapeutic robot-assisted neck dissection via a retroauricular or modified facelift approach in head and neck cancer: A comparative study with conventional transcervical neck dissection. Head Neck 37(2):249–254, 2015. doi:10.1002/hed.23595.
17. Song CM, Ji YB, Kim KR, et al: Robot-assisted excision of branchial cleft cysts using a postauricular facelift approach. Auris Nasus Larynx 42(5):424–427, 2015. doi:10.1016/j.anl.2015.03.009.
18. Albergotti WG, Byrd JK, Nance M, et al: Robot-assisted neck dissection through a modified facelift incision. Ann Otol Rhinol Laryngol 125(2):123–129, 2016. doi:10.1177/0003489415601127.
19. Tae K, Ji YB, Song CM, et al: Feasibility of robot-assisted modified radical neck dissection by postauricular facelift approach. Int J Oral Maxillofac Surg 45(11):1351–1357, 2016. doi:10.1016/j.ijom.2016.05.010.
20. Griffin JE, Jo C: Complications after superficial plane cervicofacial rhytidectomy: A retrospective analysis of 178 consecutive facelifts and review of the literature. J Oral Maxillofac Surg 65(11):2227–2234, 2007. doi:10.1016/j.joms.2006.10.075.
21. Rühle A, Grosu A-L, Nicolay NH: De-escalation strategies of (chemo)radiation for head-and-neck squamous cell cancers—HPV and beyond. Cancers 13(9):2204, 2021.
22. Ma DM, Price K, Moore EJ, et al: MC1675, a Phase III evaluation of de-escalated adjuvant radiation therapy (dart) vs. standard adjuvant treatment for human papillomavirus associated oropharyngeal squamous cell carcinoma. Int J Radiat Oncol Biol Phys 111(5):1324, 2021. doi:10.1016/j.ijrobp.2021.09.012.
23. Liu M, Wang SJ, Yang X, et al: Diagnostic efficacy of sentinel lymph node biopsy in early oral squamous cell carcinoma: A meta-analysis of 66 studies. PLoS One 12(1) e0170322, 2017. doi:10.1371/journal.pone.0170322.
24. Ji YB, Song CM, Bang HS, et al: Functional and cosmetic outcomes of robot-assisted neck dissection by a postauricular facelift approach for head and neck cancer. Oral Oncol 70:51–57, 2017. doi:10.1016/j.oraloncology.2017.05.014.