Characterizing the Recovery of Facial Nerve Complications After Parotidectomy

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INTRODUCTION

- Preservation of facial nerve function is of critical importance during parotidectomy.
- Facial nerve paresis is a distressing and important complication after parotidectomy.
- Other known outcomes after parotidectomy may include facial nerve numbness, Frey syndrome, dysgeusia, seromas, infections, and abscesses [1-4].

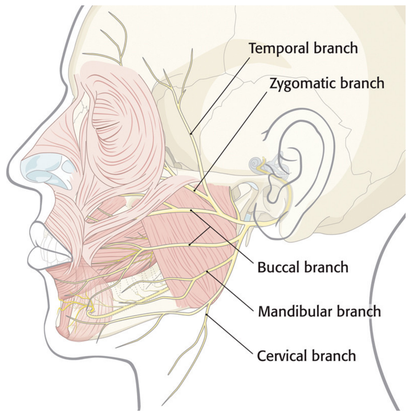

Figure 1. Facial Nerve Anatomy. [5]

- How patient-, disease-, and treatment- factors affect the temporal trajectory of facial nerve paresis and the recovery after other complications remain understudied.
- A better understanding of the time course over which facial nerve paresis, numbness, Frey syndrome, and dysgeusia improve can allow clinicians to better inform patients of risks during informed consent. This information may also motivate the development of therapeutics to expedite recovery from these complications.

METHODS

- A retrospective review of adult patients who underwent parotidectomy between 2006 and 2021 and analysis of the literature was performed.
- Patients undergoing revision surgery, whose parotidectomy indication was a head and neck cancer involving the facial nerve, or who had baseline facial paresis were excluded.
- Patients with parotidectomy complications (facial nerve weakness, facial numbness, Frey syndrome, dysgeusia, tearing within the study period and any seroma, infection/abscess, ED visits within 3 months post-operatively) were included and the timeline and trajectory of improvement of their complications reported.
- Demographic details, medical history, social history and family history were collected. Parotidectomy details including type of parotidectomy (superficial or deep parotidectomy), facial nerve dissection, sacrifice or no manipulation of the facial nerve, and disease details such as benign vs. malignant disease and lesion size were collected from patients' charts. (Facial nerve weakness was defined as a House-Brackmann score of 2 or greater or language describing facial weakness such as incomplete eye closure, asymmetrical smile, etc. if no House-Brackmann score was noted.
- Facial paresis recovery was defined as a persistent decrease of the House-Brackmann score below 2, occurring within 2 years after parotidectomy.

Statistical Analysis:

- Univariate relationships between patient demographics, medical history, social history, disease pathology, and surgical variables and parotidectomy outcomes were explored.
- Correlations were used to evaluate relationships between continuous predictor variables (e.g., age, size of lesion, etc.) and time to recovery after paresis (continuous variable).
- 2-sided Student's t-test was used to evaluate if there was a relationship between a categorical predictor variable and time to recovery.
- For complications that > 30 patients experienced (any facial nerve weakness, numbness, or seroma), univariate relationships with continuous predictor variables were assessed using one-way ANOVA, categorical predictor variables were assessed using a chi-squared test, and multivariable relationships were assessed using generalized linear models with a binary response term (any facial nerve weakness, numbness, or seroma) selected using backward elimination approach.

RESULTS

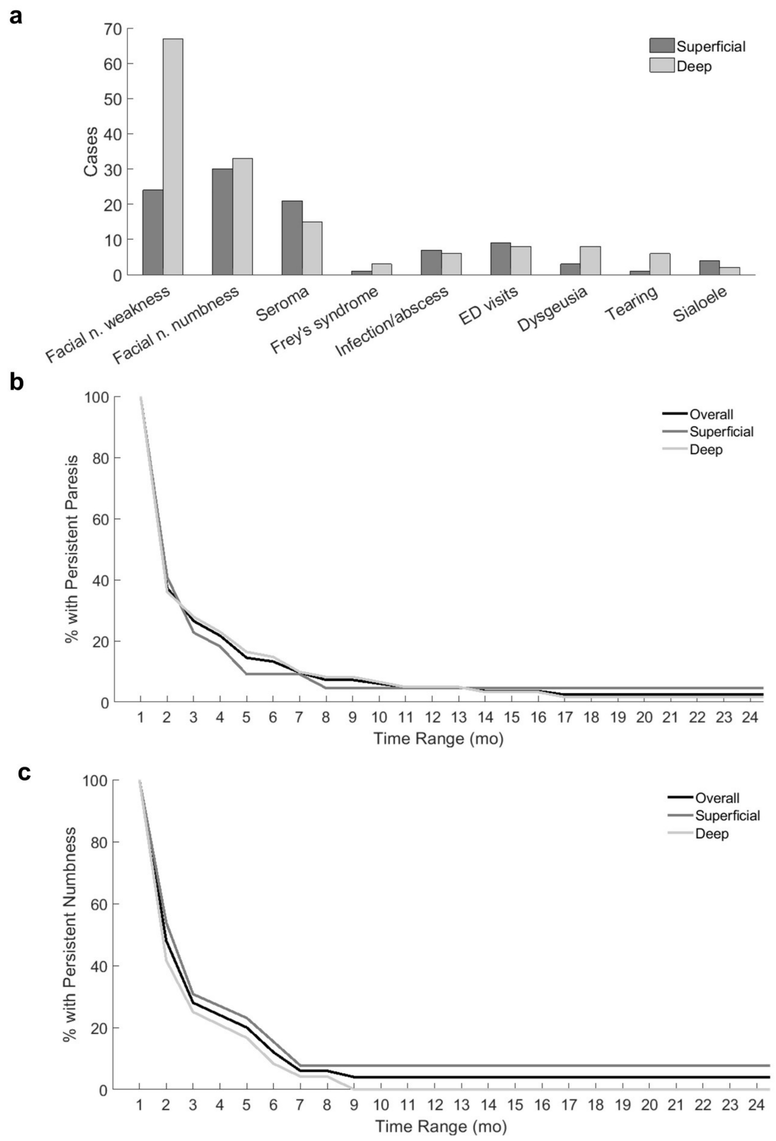

Fig. 2. Parotidectomy complications stratified by superficial vs. deep parotidectomy. (a) Cases identified of each complication. (b) Recovery of patients that experienced any facial nerve paresis 2 years after surgery. (c) Recovery of patients that experienced any facial nerve numbness 2 years after surgery.

	Paresis	*Numbness*	*Seroma*	*Time to Recovery of Paresis*
Age	0.782	0.002**	0.615	0.542
Sex (female, male)	0.940	0.075	0.475	0.407
Race (White, Asian, Other)	0.172	0.771	0.537	0.046*
Lesion size	0.005**	0.652	0.135	0.874
Benign pathology (rel. to malignant)	0.004**	0.390	0.065	0.368
Superficial (rel. to deep)	< 0.001***	0.884	0.149	0.695
Dissection (none, dissection, sacrifice)	0.009**	0.716	0.026*	0.291
Post-op days until discharge	0.351	0.241	0.964	0.065
Comorbidity (CCI)	0.050	0.288	0.254	0.713
Salivary gland disease history	0.338	0.010*	0.062	0.327
Bell's palsy history	< 0.001***	0.664	0.221	0.692
Thyroid disease	0.082	0.203	0.796	--
Sleep apnea	0.174	0.995	0.242	0.619
Autoimmune disease	0.689	0.895	0.405	0.545
Family history of cancer	0.930	< 0.001***	0.207	0.162
Hypertension	0.424	0.313	0.464	0.453
GERD	0.824	0.889	0.794	0.193
Radiation therapy history	0.072	0.484	0.279	--
Diabetes	0.525	0.735	0.820	0.158
Smoking (rel. to never)	0.583	0.897	0.250	0.744
Alcohol use (rel. to none)	0.672	0.089	0.376	0.383

Table 1. Univariate analysis of factors predicting the parotidectomy outcomes. Outcomes assessed were any facial nerve (n.) weakness or numbness within 2 years post-operatively, any seroma within 3 months post-op, and the time to recovery if paresis occurred. Chi-squared tests were used to assess outcomes of any facial n. weakness, numbness, or seroma, ANOVA was used to assess relationship between race and dissection type and time to recovery of the facial n., and correlation coefficients were used to assess the relationship between age, lesion size, post-operative days until discharge, and comorbidity (Charlson Comorbidity Index, CCI) and time to recovery of facial n. All other relationships were assessed using 2-sample 2-sided t-tests.

RESULTS

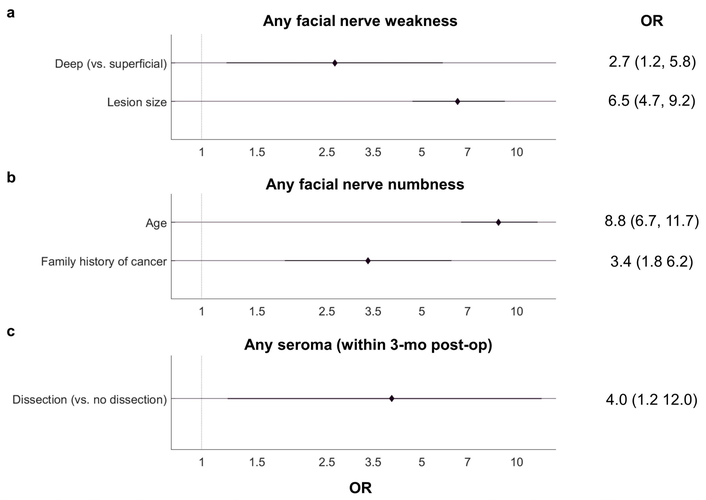

Fig. 3. Predictors of parotidectomy complications. Forest plots summarizing multivariable generalized linear models that were used to identify factors that predicted parotidectomy complications. **(a)** Deep vs. superficial parotidectomy and larger lesion size were significantly related to facial nerve weakness. **(b)** Age and family history of cancer were significantly related to a greater odds of developing facial nerve numbness. **(c)** Dissection vs. none of the facial nerve was significantly associated with seroma within 3 months post-operatively.

DISCUSSION

- Of the 91 adult individuals with facial nerve weakness after parotidectomy for benign disease not involving the facial nerve, recovery most frequently occurred within 6 months. By 2 years all but 2.4% had recovered.
- The overall incidence of facial nerve weakness declined to below 5% of all patients who originally had weakness by 3-6 months post-operatively and < 2% by 6 months to 1 year post-operatively (Fig. 1b) and was higher across all time points after deep relative to superficial parotidectomy.
- The median time to recovery of facial nerve paresis was 102 days (mean was 126 days).
- Other parotidectomy complications noted included: facial nerve numbness (n = 63), seroma (n = 36), Frey syndrome (n = 4), infection/abscess (n = 13), emergency room visits (n = 17), dysgeusia (n = 11), tearing (n = 7), and sialocele (n = 6).
- Multivariable regression analyses highlighted that:
  - Larger lesion size and deep parotidectomy were associated with a higher likelihood of developing facial nerve paresis
  - Older age and a family history of cancer were associated with a higher likelihood of developing facial nerve numbness
  - Facial nerve dissection relative to no manipulation was associated with a higher likelihood of developing seroma.

CONCLUSIONS

- In counseling patients undergoing parotidectomy for benign disease clinicians should discuss the management and time course of possible complications. For individuals with paresis after surgery, clinicians may reassure their patient that this lasts 3-4 months on average, and the risk of residual paresis when this occurs is less than 3%.

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