

Comparative Study between Antegrade and Retrograde Facial Nerve Dissection in Superficial Parotidectomy

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Introduction: Facial nerve injury is the most dreaded and most feared complication in parotid surgery, many techniques were used for its proper identification and safeguarding.

Aim: Is to compare both antegrade and retrograde facial nerve dissection regarding complications mainly facial nerve injury.

Patients and methods: We had 2 randomly divided equal groups, 18 patients each. Group A had antegrade parotidectomy and group B had retrograde parotidectomy. Patients were followed up for 1 year.

Results: Group B had shorter operative time 121 ± 31.8 vs. 148 ± 22.27 min in group A. Also group B had a slight shorter hospital stay. Early facial nerve affection was less in group B 27% vs 33% in group A, and late affection was much more in group A 11% vs 0% in group B.

Conclusion: Retrograde parotidectomy is a safe and easy technique with a high safety profile in parotidectomy for benign disease.

Key words: Parotidectomy, antegrade, retrograde, facial palsy, nerve sparing.

Introduction

Facial nerve palsy (FNP) is known to be the major complication in parotid gland surgery, facial nerve identification, preparation and keeping its intactness are all crucial steps in parotid surgery. These become even more significant when taking into account the high percentage (80–85%) of benign lesions of the parotid which lead to the surgical procedures.¹⁻³

Superficial parotidectomy is a very effective treatment for parotid tumors. The recurrence rate after this surgery for pleomorphic adenoma is extremely low.^{4,5}

Parotidectomy is classically performed by the antegrade facial nerve dissection technique: Antegrade parotidectomy (AP), where the facial nerve trunk is first identified and safeguarded initially. The nerve is then followed and traced towards the periphery of the parotid gland. The tumor superficial to it is removed by meticulous dissection, while the facial nerve branches are preserved. Recently, partial parotidectomy, in which only part of the superficial lobe is excised with a cuff of normal salivary tissue around the tumor, was advocated as a safe alternative to the formal superficial parotidectomy.⁶

Sistrunk in 1921 and Arson and Ott in 1923, first described the retrograde exposure of the marginal mandibular branch of the facial nerve to lead to the nerve trunk, but the technique was not widely

practiced at that time.⁷ Janes in 1940 advocated a new direct approach to the nerve trunk and this led to the wider the adoption of the antegrade dissection technique.⁸

A number of recent publications have renewed attention to the retrograde technique and its safety profile contributing to revival of this technique.⁹⁻¹¹

In the retrograde dissection technique, peripheral branches are identified first and then proceeding towards the main trunk in a retrograde manner.¹²

Proposed benefits of this approach are its lower rates of immediate and permanent FNP, shorter cut-suture times (CST), less intraoperative blood loss and finally the removal of less healthy parotid tissue which in turn results in decreased postoperative facial cosmetic deformation.^{13,14,9}

In this study we decided to evaluate the safety and feasibility of the retrograde technique compared to the antegrade technique.

Patients and methods

This randomised prospective comparative study was held in Ain-Shams university hospitals during the period between January 2017 and January 2019 over 36 patients with benign parotid lesions. Patients with recurrent or malignant lesions and those with pre-operative facial nerve affection were excluded from our study.

Thirty six patients were randomly divided into 2 equal groups using closed envelopes methods, each group was made of 18 patients; group A: Antegrade parotidectomy (AP) and group B: Retro-grade parotidectomy (RP).

All the cases were done by the same surgical team, with informed and oral consents where the procedure along with all its possible complications were thoroughly explained to the patients.

All patients had routine laboratory pre-operative investigations along with neck ultrasonography and some cases required neck CT-scan with IV contrast. All cases were subjected to pre-operative Fine needle aspiration cytology (FNAC) to confirm the benign nature of the disease.

The exposure was similar in both groups using the Lazy S incision (cervico-mandibulo-facial incision), this was followed by entering the sub-platysmal plane till reaching the anterior border of the parotid. The great auricular nerve was identified and preserved as much as possible.

In the AP group the facial nerve trunk was identified usually after identification of the pointer prominence. The trunk was then followed up towards the gland to centrifugally dissect all its branches with removal of the parotid tissue superficial to them.

In the RP group (**Figure 1**), blunt dissection was

done at the anterior border of the gland where the parotid duct was used as a landmark to identify the buccal branch of the facial nerve. The duct was routinely ligated and divided. The retromandibular vein was used to identify the marginal mandibular branch while the zygomatic branches were located below the lower border of the zygomatic arch. We had no preferred order in dissection of the branches but we usually started with the buccal branch. We followed the branches in a retrograde manner till reaching the main facial nerve trunk.

After removal of the gland, careful haemostasis was done and then application of suction drain and subcuticular closure of the wound.

All the patients were followed up searching for complications, during their hospital stay, and at regular visits (1 week, 3 months, 6 months and 1 year). Facial nerve assessment was done using House-Brackmann score.

Data were collected and statistically analyzed. Continuous data were presented as mean \pm standard deviation (SD). Categorical data were presented as percentages. Analysis of variance (ANOVA) and the rank-sum test were used to analyze continuous data. The results were significant (S) with $P < 0.05$ & highly significant (HS) with $P < 0.01$, $P \geq 0.05$ were regarded non-significant (NS). Statistical analysis was done using IBM SPSS statistical software (version 21).

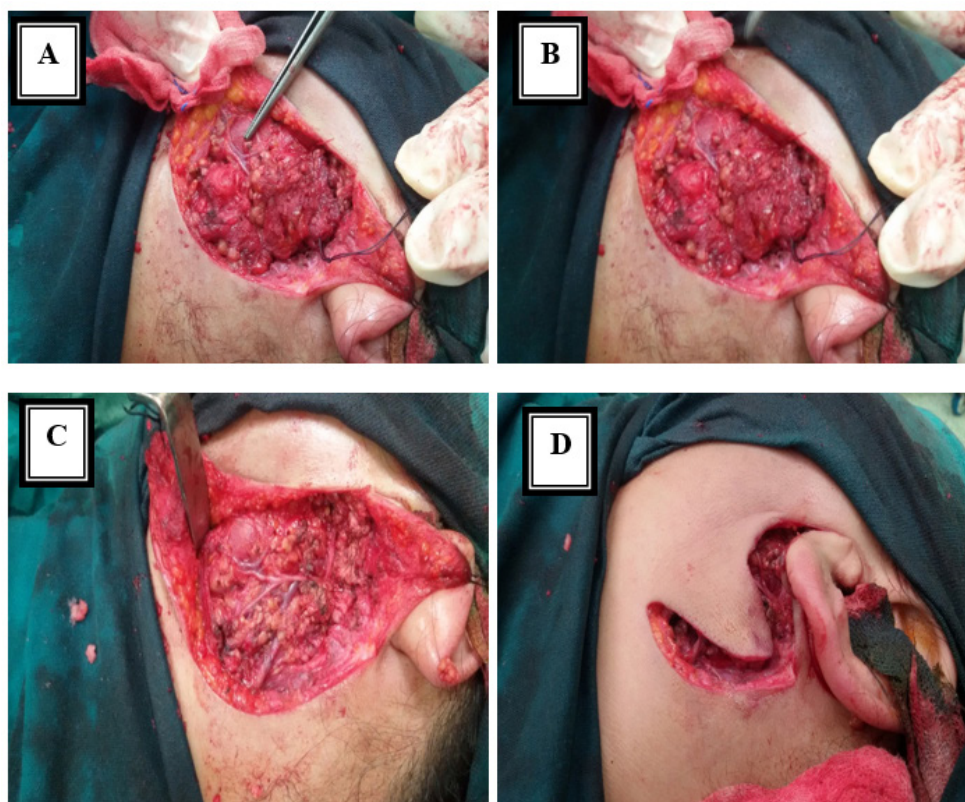


Fig 1: Retrograde facial nerve dissection (A&B: Identification of buccal branch, C: After removal of the tumor, D: Skin flaps before closure).

Results

In this study we had 2 equal groups, 18 patients each; group A: Ante-grade parotidectomy (AP) and group B: Retro-grade parotidectomy (RP). In group

A we had 11 males and 7 females (**Figure 2**) with mean age of 39 ± 4.18 years, while in group B we had 10 males and 8 females with mean age of 42 ± 3.6 years.

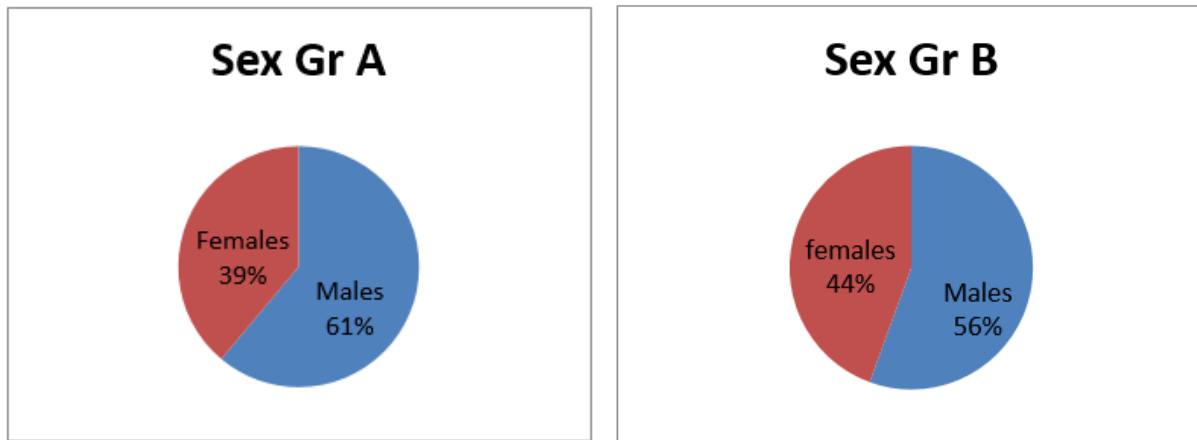


Fig 2: Sex difference in both groups.

The mean operative time was 148 ± 22.27 min in group A vs. 121 ± 31.8 in group B.

The mean post-operative hospital stay was 2.3 ± 2.01 in group A vs. 2.1 ± 1.86 in group B.

Histopathological findings were: Group A 13 cases

of pleomorphic adenoma, 2 cases of Warthin's tumour, one case of monomorphic adenoma, while group B there were 15 cases of pleomorphic adenoma, one case of Warthin's tumour, one case of myoepithelioma and one case of sialadenitis (**Figure 3**).

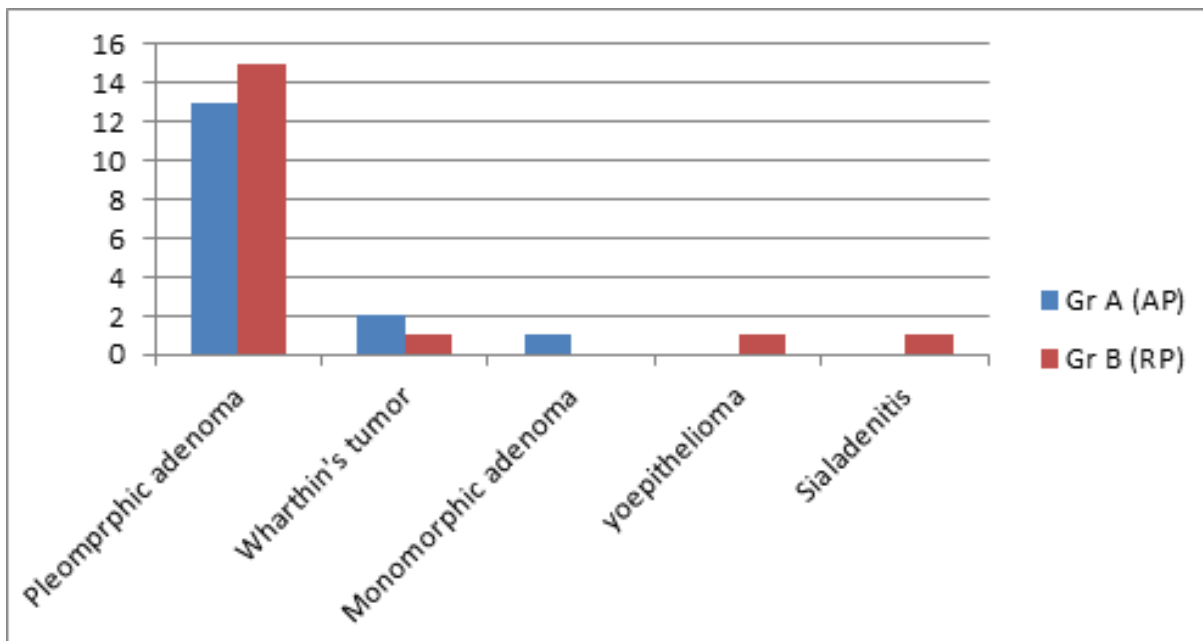


Fig 3: Pathological types of parotid lesions in both groups.

Regarding facial nerve injury it was divided into Temporary and permanent injuries and according to House-Brackmann's classification that ranges from completely normal (G1) to severe paresis or complete paralysis detected at rest (G6), patients of group A had 6 cases of early facial nerve affection with only 2 cases of persistent nerve injury (both were HB-5 and 6 from the start involving the buccal

branch), the upper trunk was involved in the other 4 cases, all improved during the period between 1 month and 6 months post-operatively, while group B had 6 cases of temporary affection (2 buccal, 2 upper trunk and 2 cervico facial affection) who improved all at the period of 6 months with no evident residual affection.

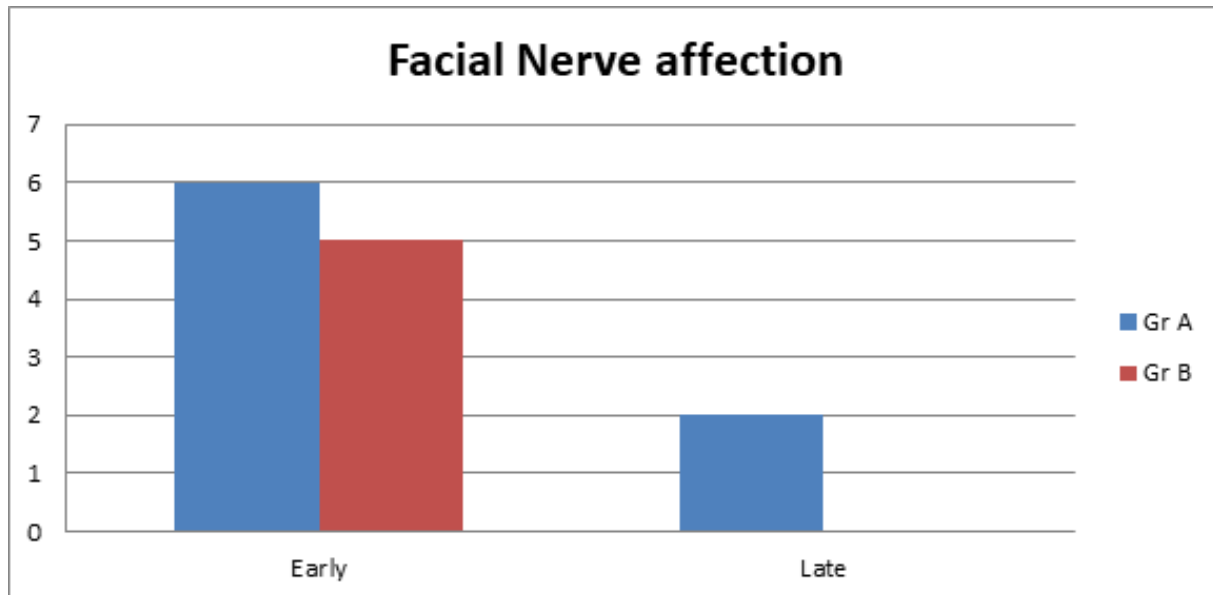


Fig 4: Facial nerve affection in both groups.

There was a case of salivary fistula in group A only which was managed conservatively using Pro-Banthen 40mg tab and continuous compression till

improvement at the 6 months visit and also there was 1 case of wound seroma in group B that was managed by repeated needle aspiration.

Table 1: Differences between both groups

		Group A (AP)	Group B (RP)	P Value
Operative time (min)		148 min	128 min	<0.05 (S)
Postoperative hosp. Stay (days)		2.3 days	2.1 days	>0.5 (NS)
Complications				
Facial nerve affection	Early	n=6 (33%)	n=5 (27%)	>0.5 (NS)
	Late	n=2 (11%)	n=0	<0.05 (S)
Salivary fistula		n=1 (5.5%)	n=0	>0.5 (NS)
Wound seroma		n=0	n=1 (5.5%)	>0.5 (NS)

Discussion

Retrograde facial nerve exposure can refer to finding a branch of the facial distal to the gland first, then dissection is done proximally to isolate the main trunk, which is then used to locate all the remaining

distal branches.¹²

In this study we had 2 equal groups of patients which are made of 18 patients each, group A (AP) and group B (RP).

The study revealed that group A had a significantly longer operative time, while post operative hospital stay was slightly but insignificantly longer. In group A there was also a single case of salivary fistula compared to a single case of wound seroma in group B.

Regarding facial nerve affection, it was higher in the AP group when compared to RP group, in early period and significantly higher in late or permanent affection.

In the study done by chow et al.¹⁵ comparing the same 2 techniques, the mean operative time was 176.2± 34.9 min in the AP group compared to 144±60.3 min in the RP group, in our study it was 148± 22.27 min in the AP group and in the RP group the operative time was 121±31.8 min.

Regarding the facial nerve affection, in our study temporary or early nerve affection was found in 33% of cases in AP versus 27% in RP group, while permanent or late affection was found to be in 11% of cases in AP group versus 0% in RP group. In the study done by O'Regan et al.¹⁶ prospectively comparing the 2 techniques over a period of 4 years, they observed that regarding the recovery of the facial nerve in both groups, the retrograde group seemed mostly to recover from serious nerve injury faster than those in the antegrade group. Proportionately more patients had fully recovered in the retrograde group than in the antegrade group at a period of 1 month and 3 months. Almost most of the cases had recovered fully at 6 months. All patients in both groups had recovered fully at 1 year. In the study of Kligerman et al.¹⁷ the rate of Facial nerve injury was 13.6% in early cases with mostly mild degrees of affection that turned to be 2.3% after one year of follow up, while in the study of Gurung et al.¹⁸ temporary facial palsy was 13.3% with no cases of permanent affection in the RP technique done for 60 patients.

In the systematic review done by Stankovic et al.¹⁹ comparing both methods for parotidectomy; temporary facial nerve palsy was found to be 34.4% in the AP versus 18.2% in the RP, while permanent palsy was 2.4% in AP versus 0.8% in AP.

Conclusion

Retrograde parotidectomy is considered a safe and easy technique with a low complication rate and shorter operative time in cases of benign parotid lesions as compared to the widely used antegrade technique.

References

1. Maahs GS, Oppermann Pde O, Maahs LG, Machado Filho G, Ronchi AD: Parotid gland tumors: a retrospective study of 154 patients.

Braz J Otorhinolaryngol. 2015; 81(3): 301–306. <https://doi.org/10.1016/j.bjorl.2015.03.007>.

2. Lin CC, Tsai MH, Huang CC, Hua CH, Tseng HC, Huang ST: Parotid tumors: A 10-year experience. *Am J Otolaryngol.* 2008; 29(2): 94–100. <https://doi.org/10.1016/j.amjot.2007.03.002>.
3. Fundakowski C, Castano J, Abouyared M, Lo K, Rivera A, Ojo R, Gomez-Fernandez C, Messinger S, Sargi Z: The role of indeterminate fine-needle biopsy in the diagnosis of parotid malignancy. *Laryngoscope.* 2014; 124(3): 678–681. <https://doi.org/10.1002/lary.24341>.
4. Laskawi R, Schott T, Mirzaie-Petri M, Schroeder M: Surgical management of pleomorphic adenomas of the parotid gland: A follow-up study of three methods. *J. Oral. Maxillofac. Surg.* 1996; 54: 1176–1179.
5. Leverstein H, Van der Wal JE, Tiwari RM, Van der Waal I, Snow GB: Surgical management of 246 previously untreated pleomorphic adenomas of the parotid. *Br. J. Surg.* 1997; 84: 399–403.
6. O'Brien CJ: Current management of benign parotid tumours – the role of limited superficial parotidectomy. *Head Neck.* 2005; 25: 946–952.
7. Seifert G, MiehlikeA, Haubrich J, Chilla R. In: Seifert G, editor. Diseases of the salivary glands—pathology—diagnosis—treatment—facial nerve surgery. New York: *Thieme Publishing Group (January 1, 1986), 1st ed.; P(329). ISBN-13: 978-3136891018.*
8. Janes RM: The treatment of tumors of salivary gland by radical excision. *Can Med Assoc J.* 1940; 43: 554–559.
9. Bhattacharyya N, Richardson ME, Gugino LD: An objective assessment of the advantages of retrograde parotidectomy. *Otolaryngol Head Neck Surg.* 2004; 131: 392–396.
10. Yu GY: Superficial parotidectomy through retrograde facial nerve dissection. *J R Coll Surg Edin.* 2001; 46: 104–107.
11. Wang DZ, Liu SJ, Donoff RB, Guralnick W: A modified centripetal approach to parotidectomy. *J Oral Maxillofac Surg.* 1985; 43: 14–19.
12. Chan S, Gunn A: Conservative parotidectomy by the peripheral approach. *Br J Sur.* 1981; 68: 405–407.
13. Scarpini M, Bonapasta S, Ruperto M, Vestri A, Bononi M, Caporale A: Retrograde parotidectomy

- for pleomorphic adenoma of the parotid gland: a conservative and effective approach. *J Craniofac Surg.* 2009; 20(3): 967–969. <https://doi.org/10.1097/SCS.0b013e3181a14bb4>.
14. Furusaka T, Tanaka A, Matsuda H, Hasegawa H, Asakawa T, Shigihara S: Cervical branch of the facial nerve approach for retrograde parotidectomy compared with anterograde parotidectomy. *Acta Otolaryngol.* 2014; 134(11): 1192–1197. <https://doi.org/10.3109/00016489.2014.900701>.
 15. Tam-Lin Chow, Chi-Yee Choi, Stephanie Hay-Man Cheung and Siu-Ho Lam: Antegrade versus retrograde facial nerve dissection: *Surgical Practice.* 2011; 15: 120–123, doi:10.1111/j.1744-1633.2011.00561.x.
 16. Barry O'Regan, Girish Bharadwaj: Comparison of facial nerve injury and recovery rates after antegrade and retrograde nerve dissection in parotid surgery for benign disease: prospective study over 4 years. *British Journal of Oral and Maxillofacial Surgery.* 2011; 49: 286.
 17. Maxwell P. Kligerman, Yohan Song, David Schoppy, Vasu Divi, Uchechukwu C. Megwalu, Bruce H. Haughey, Davud Sirjani: Retrograde Parotidectomy and facial nerve outcomes: A case series of 44 patients. *American Journal of Otolaryngology–Head and Neck Medicine and Surgery.* 2017; 38: 533–536.
 18. Gurung NV, Shrestha D, Acharya A, Gurung A, Shrestha S, Poudel SR, Chapagain A, Regmi SM: Superficial parotidectomy by retrograde facial nerve dissection. *J-GMC-N.* 2017; 10(1): 25-27.
 19. Stankovic P, Wittlinger J, Timmesfeld N, Stephan SH, Georgiew R, Günzel T, Teymoortash A, Wilhelm T: Antero-vs. retrograde nerve dissection in parotidectomy: A systematic review and meta-analysis, *European Archives of Oto-Rhino Laryngology, Springer-Verlag GmbH Germany, part of Springer Nature.* 2018; 275(6): 1623-1630. <https://doi.org/10.1007/s00405-018-4982-8>.