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Anatomic variation of the relation between the facial nerve and the retromandibular vein during superficial parotidectomy: A rare case report



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ABSTRACT

INTRODUCTION: Identification and preservation of the facial nerve (FN) is a major challenge when performing parotidectomy. Anatomic variations of the relation between the FN and the retromandibular vein (RMV) pose a high risk of nerve injury and bleeding during the operation.

PRESENTATION OF CASE: An unusual anatomic variation of the relation between the FN and the RMV was unexpectedly detected during superficial parotidectomy. The operation was uneventful. A meticulous review of the recent literature was conducted as well.

DISCUSSION: Variations of the relation between the FN and the RMV are mainly identified during the operation, since when performing parotidectomy, surgeons typically detect all the FN branches by locating the RMV. Such kind of variations, are not as rare as considered and their presence complicates parotid surgery and increases the potentiality of nerve injury and hemorrhage.

CONCLUSION: Surgeons' deep knowledge and perpetual awareness concerning the probable anatomic variations of the relation between the FN and the RMV combined with detailed exposure of the operative field and of the relationship between these adjacent anatomical structures lead to safe parotid surgery.

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1. Introduction

Identification and preservation of the facial nerve (FN) is crucial when performing parotidectomy [1,2]. The FN is an important cranial nerve that controls many different functions [3]. Surgeons typically identify the FN and its branches during parotidectomy by locating the retromandibular vein (RMV) [4]. However, variations in the relationship of the FN with the RMV, as in the presented case, complicate parotid surgery and increase the potentiality of nerve injury or bleeding [3–5]. The present manuscript that aims to highlight an anatomic variation and its severe implications for parotidectomy has been reported in line with the SCARE criteria [6].

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2. Case report

A 70-year-old male patient proceeded to our institution with a 6-month history of an enlarging ulcerated nodule of the skin that overlies the right parotid gland. The patient's medical history revealed ulceration and intense pain of the lesion the last 2 months. Clinical examination certified trophic alterations of the overlying skin and revealed palpable parotid lymph nodes, which were detected as static and painless masses of hard consistency. The initial diagnosis was squamous cell carcinoma of the skin. Subsequently, radiographic analysis was performed, including CT of the head that indicated metastasis to the parotid lymph nodes, and CT of the neck which was unremarkable. Following this, right superficial parotidectomy, elective parotid lymph node dissection and skin reconstruction with local flaps was scheduled.

The parotidectomy was initiated with a preauricular incision. The tragal pointer was used as a standard anatomic landmark for the identification of the FN trunk. When surgeons elevated the superficial lobe of the parotid gland and they exposed carefully the operative field, they observed that the FN bifurcated into the cervicofacial(inferior) division and the upper bigger temporofa-

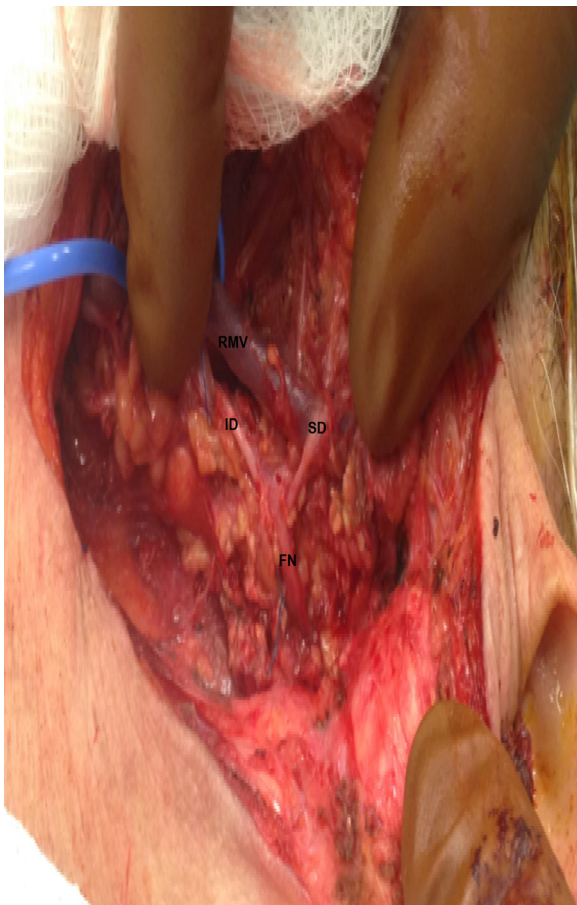


Fig. 1. Exposure of the FN main trunk and its bifurcation in relation with the RMV.

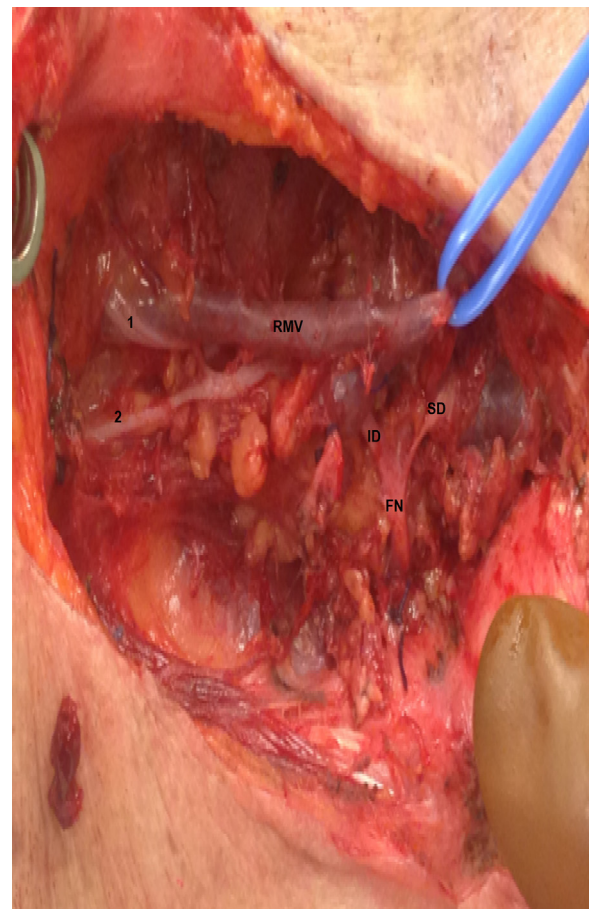


Fig. 2. 1) mandibular/2) cervical nerve branches/RMV: retromandibular vein/FN: facial nerve trunk/SD: superior division/ID: inferior division.

cial division. (Fig. 1) The main trunk was carefully isolated in order to avoid nerve injury and subsequent severe morbidities. While performing descending dissection of the FN, they unexpectedly identified that the RMV passed superficially to both the mandibular and the cervical branch of the inferior division of the FN. (Fig. 2) The surgeons retracted the superficial RMV gently with a vessel loop for better exposure of the FN branches and for avoidance of accidental damage of the vein and bleeding. Apart from the previously mentioned anatomic variation, surgeons incidentally detected that a single buccal branch, originating from the temporofacial division of the FN, coursed deeper, rather than superficial to the RMV, although the temporal and zygomatic branch, overlaid the vein, as commonly (Figs. 3 and 4). After exposing and isolating meticulously all the FN branches the operation continued in the usual fashion. At the end of the parotidectomy, surgeons evaluated once again that all the FN branches remained intact. Then, a vacuum drainage was placed and it was finally removed the 1st postoperative day.

The patient was discharged the 5th postoperative day with instructions and he had no any postoperative complications. The histopathological report of the surgical specimen revealed squamous cell carcinoma of the skin.

3. Discussion

The FN is the most important anatomical structure that has to be identified and preserved during parotidectomy [1]. The FN is an essential cranial nerve (CN: VII) that transmits some sensory information from the anterior two-thirds of the tongue's tip and it innervates facial muscles, controlling how to contract and produce multiple facial expressions as well.

Nowadays, parotid surgery is a common surgical procedure. Hence, the cornerstone for a safe and adequate operation is giving emphasis to the exact, detailed description of the anatomy of the facial nerve and its branching pattern. There are several anatomic landmarks for the intraoperative identification of the FN, such as the stylomastoid foramen, the tympanomastoid fissure, the posterior belly of the digastric muscle, the tragal pointer and the retromandibular vein (RMV) [7,8].

Moreover, the relation between the FN and the RMV is of paramount clinical significance during the operation, for the identification and protection of all the FN branches [5]. The surgical step of the identification of the trunk of the FN and of the type of its bifurcation is of key importance in order to avoid injury of the nerve branches [9]. Indeed, the branching type of the FN may vary among individuals. Nevertheless, the FN most frequently bifurcates into the inferior cervicofacial and the superior temporofacial divisions, as in the presented case [7,9].

However, localizing the FN branches based on their relationship with the RMV is not as easy as described in the literature, since the classical relationship, in which the RMV lies deep to the FN, is not detected as usually as thought during parotid surgery [5]. In fact, anatomic variations of the relation between RMV and FN occur with a prevalence of 11.83% [5] and they pose a high risk of FN branches injury and bleeding [3,5,8]. Indeed, the reported incidence of FN palsy during parotid surgery is almost 21% and such a postoperative complication is even more probable when surgeons encounter anatomic variations of the relationship between FN and RMV [10].

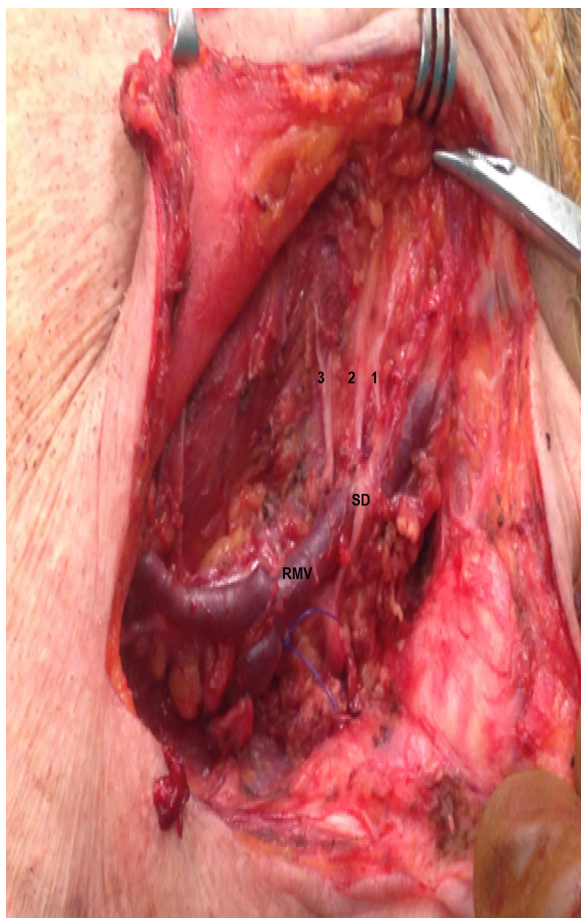


Fig. 3. The superior division of the FN. 1: temporal/2: zygomatic/3: buccal nerve branches.

There are several documented variations of this relationship in the literature. More specifically, as it is described the RMV may be detected laterally to the cervicofacial division and medial to the temporofacial division [1,8]. In addition, the RMV may be detected lying anterior to the FN as a ring around the nerve branches or as a fork formed by the vein branches [3,8,11].

Although several classification systems have been suggested in the literature [5,11] there seems to be no “rule” concerning the relation between RMV and FN. Nevertheless, these two anatomic structures are always in close proximity [1,3]. Herein, it is quite evident that probable novel variations of this relationship may be detected since the existing literature is restricted.

Finally, the RMV may be used during MRI or CT in order to localize approximately the distance between the parotid lesion and the FN, for avoidance of FN injury during the operation [5,12] since pre-operative radiographic analysis cannot allow direct visualizing of the FN [11]. Therefore, the relation between the RMV and the FN is of key importance in localizing the parotid tumors preoperatively in order to minimize FN surgical injury as well.

4. Conclusion

There are several documented variations of the relation between the FN and its branches with the RMV. Nevertheless, it seems that they are actually more common than described in the literature and that there are possible patterns of variations that have not been described yet. All these anatomic variations consist major risk-factors of bleeding and of facial nerve injury. Hence, surgeons’ deep knowledge in addition to detailed exposure of the operative

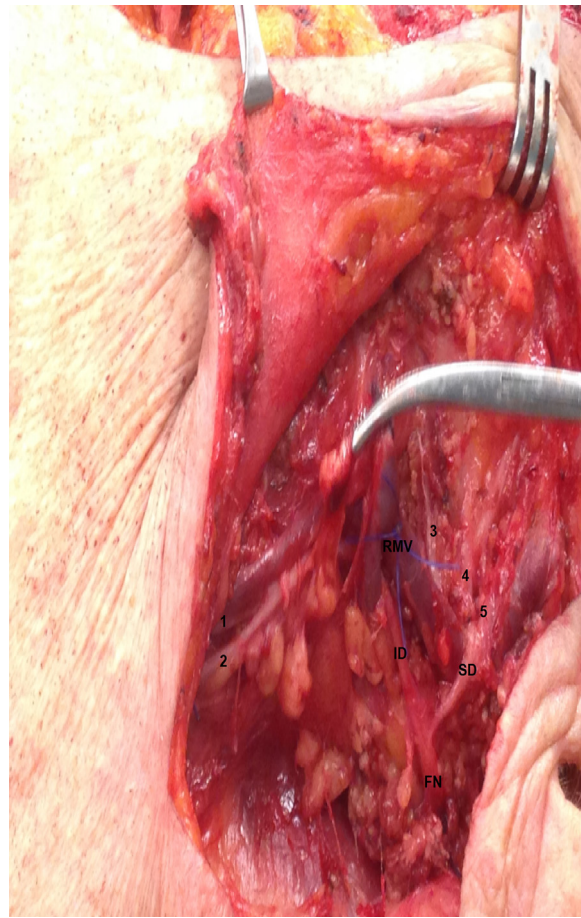


Fig. 4. Exposure of the anatomic relation between the FN and the RMV. 1: mandibular/2: cervical/3: buccal/4: zygomatic/5: temporal nerve branches.

field and particularly of the relation between the FN and the RMV, which are adjacent anatomical structures, are the cornerstone in order to perform a safe parotid surgery without harmful impacts to the patient.

Conflicts of interest

All authors declare that there are not any competing interests.

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Ethical approval

This is a Case Report for which the patient provided written informed consent.

Consent

Written consent for the publication of this case report and accompanying images was obtained from the patient. The consent can be provided to the Editor if he asks so.

Author contribution

Mariolis-Sapsakos and Zoulamoglou conceived of the study. Kaklamanos was senior consultant at this case report and participated in its coordination. Kakaviatos, Bonatsos and Kalles

contributed to the acquisition of clinical data, its analysis and interpretation and to the preparation of images. Zarokosta, Piperos and Sgantzios carried out the literature review. Mariolis-Sapsakos, Zarokosta and Flessas contributed to the preparation of the manuscript. Mariolis-Sapsakos and Zoulamoglou contributed to the refinement of the case report. All authors have approved the final article.

Guarantor

The Guarantors who are responsible for the present case report are Theodoros Mariolis-Sapsakos and Ioannis Kaklamanos. They coordinated the preparation of the case report and revised it critically for important intellectual content.

References

- [1] N. Bhattacharyya, M.A. Varvares, Anomalous Relationship of the Facial Nerve and the Retromandibular Vein: a case report, *J. Oral Maxillofac. Surg.* 57 (1999) 75–76.
- [2] S. Saha, S. Pal, M. Sengupta, V.P. Chowdhury, L. Mondal, Identification of the facial nerve during parotidectomy: a combined anatomical and surgical study, *Ind. J. Otolaryngol. Head Neck Surg.* 66 (2014) 63–68.
- [3] F.R. Alzahrani, K.H. Alqahtani, The facial nerve versus the retromandibular vein: a new anatomical relationship, *Head Neck Oncol.* 274 (November (4)) (2012) 82.
- [4] M.A. Babademez, B. Acar, E. Gunbey, H. Karabulut, R.M. Karasen, Anomalous relationship of the retromandibular vein to the facial nerve as potential risk factor for facial nerve injury during parotidectomy, *J. Craniofac. Surg.* 21 (2012) 801–802.
- [5] M. Piagkou, M. Tzika, G. Paraskevas, K. Natsis, Anatomic variability in the relation between the retromandibular vein and the facial nerve: a case report, literature review and classification, *Folia Morphol.* 72 (4) (2013) 371–375.
- [6] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, The SCARE Group, The SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 2016 (October (34)) (2016) 180–186.
- [7] A.R. Rai, R. Rai, K. Bhat, R. Rai, Anomalous location facial nerve deep to parotid gland, *J. Craniofac. Surg.* 22 (2011) 652–653.
- [8] D.H. Lee, T.M. Yoon, J.K. Lee, S.C. Lim, Facial nerve anomaly in a patient with a parotid tumor: a case report, *Medicine (Baltimore)* 95 (May (18)) (2016) 1–2.
- [9] K. Myint, A.L. Azian, FA Khairul The clinical significance of the branching pattern of the facial nerve in Malaysian subjects, *Med. J. Malaysia* 47 (2) (1992) 114–121.
- [10] E. Gooden, I.J. Witterick, D. Hacker, B. Rosen Irving, J.L. Freeman, Parotid gland tumours in 255 consecutive patients: Mount Sinai hospital's quality assurance review, *J. Otolaryngol.* 31 (2002) 351–354.
- [11] G. Toure, C. Vacher, Relations of the facial nerve with the retromandibular vein: anatomic study of 132 parotid glands, *Surg. Radiol. Anat.* 32 (2010) 957–961.
- [12] C.Y. Lim, H.S. Chang, K.H. Nam, W.Y. Chung, C.S. Park, Preoperative prediction of the location of parotid gland tumors using anatomical landmarks, *World J. Surg.* 32 (2008) 2200–2203.

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