

THE RELATIONS OF THE SUPERFICIAL AND DEEP LOBES OF THE PAROTID GLAND TO THE DUCTS AND TO THE FACIAL NERVE

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TWO FIGURES

The parotid gland is described by the current English, French and German text-books of anatomy as essentially a single mass, with various projections, occupying the retro-mandibular fossa and perforated by the facial nerve and its branches.

According to Grégoire ('12), Luschka recognized the division of the parotid into two portions. He quotes Luschka as follows: "Le nerf facial et ses rameaux divisent incomplètement la gland en deux portions, l'une interne plus petite, l'autre externe plus volumineuse." Grégoire cites no reference for this statement, however, nor could I find any mention of it in Luschka's text-book of anatomy ('62 and '67).

Henle ('73), however, in describing the parotid states: "Durch den Stamm und die Hauptverästelungen des N. facialis wird sie unvollkommen in eine mächtigere äussere und eine schwächere innere Schichte abgetheilt." A similar brief statement appears in the more recent edition by Henle-Merkel ('01).

This relation was confirmed by Grégoire upon careful dissections in the human (adult and fetal) and some of the mammalian species, the monkey and the rabbit. In the guinea pig and (usually) in the dog he found the facial nerve lying entirely beneath the parotid gland. In all of these cases Grégoire described the parotid as being divided into a superficial and a deep lobe with the facial nerve and its branches lying between them, except in the dog and guinea pig. He asserted that the two parotid lobes are united at their upper extremities and that this relation results from the mode of development of the gland.

In a human fetus of three months (8 cm.) he observed the parotid gland to be entirely superficial to the facial nerve. But he found the beginning of the deep lobe in a fetus of six or seven months, and concluded that further growth of the gland upward is prevented on reaching the base of the skull and that the growing extremity is apparently deflected inward and downward internal to the facial nerve to form the deep lobe.

Corresponding to this mode of origin Grégoire described the duct from the deep lobe as passing upward and outward, above the branches of the facial nerve to unite with the duct from the superficial lobe.

Since the topography of the parotid gland and the facial nerve is of great importance (especially in surgery), a further investigation of this region was undertaken at the suggestion of Prof. C. M. Jackson, to whom, as well as to Prof. R. E. Scammon, I am indebted for assistance.

I have made careful dissections of sixty-six adult human parotids (from thirty-nine male cadavers), and of thirteen parotids in the human fetus and newborn (total length 36 cm. to 54 cm.). The more important results will be stated briefly.

The human parotid gland (late fetal and adult) consists of a large superficial lobe and a smaller deep lobe (figs. 1 and 2), which are usually readily separable with the exception of a small isthmus where they are more intimately connected.

The connecting isthmus is somewhat variable in size and position, and rarely absent. It is not at the upper extremity of the gland (where a union of the two lobes is described by Grégoire), but somewhat lower, usually located near the middle or the junction of the middle and upper thirds of the gland, and somewhat posteriorly. The isthmus, except in eight of the sixty-six adult cases, consists of gland parenchyma, together with connective tissue, including vessels, and ducts of variable size and number.

The ducts of the parotid are exceedingly variable in their relations and do not conform to the type described by Grégoire. The main parotid (Stenson's) duct may be more closely associated with the superficial lobe (31 of 64 adult cases observed),

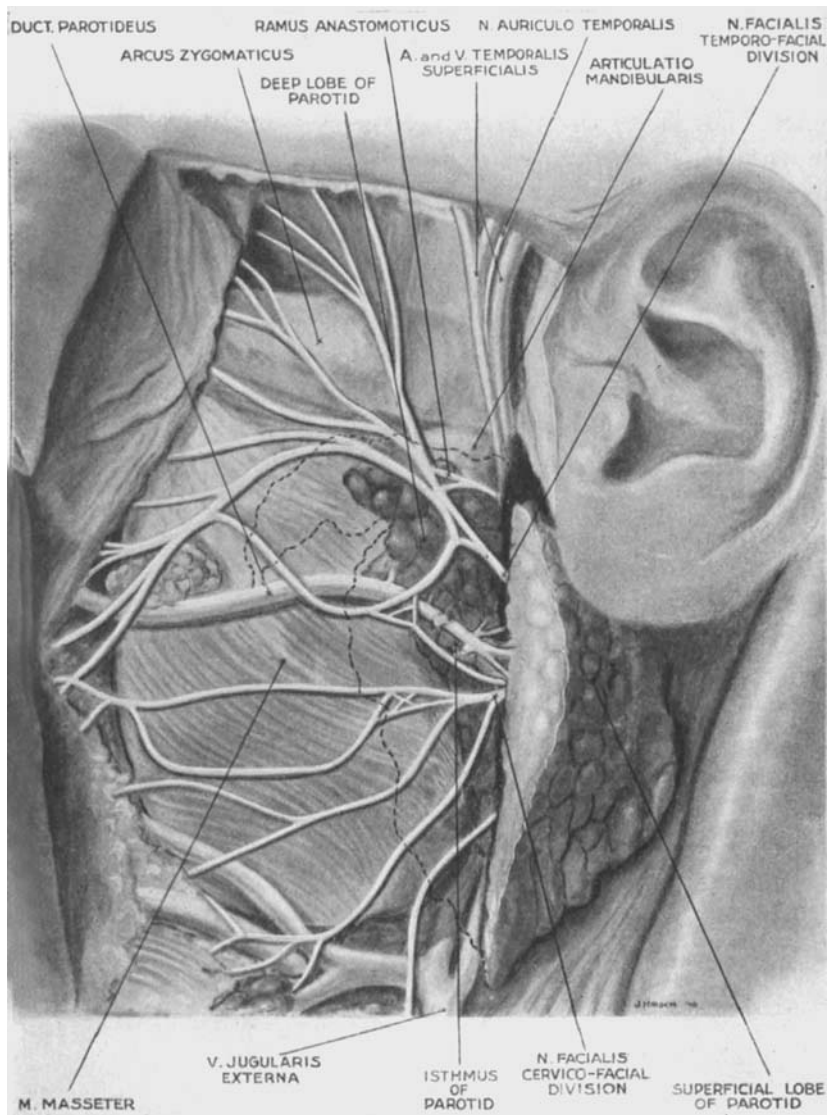


Fig. 1 Lateral view of parotid region dissected to show the relations of the superficial and the deep lobe of the parotid to the duct and to the facial nerve. The anterior portion of the superficial lobe has been removed. Its original outline is indicated by the dotted line. A small accessory lobe is shown on the anterior part of the parotid duct.

or with the deep lobe (16 of 64 cases), or may proceed between the lobes toward the region of the isthmus without intimate relation to either lobe. The main duct branches at a variable distance from the anterior border of the gland, and frequently not until reaching the region of the isthmus. The duct branches

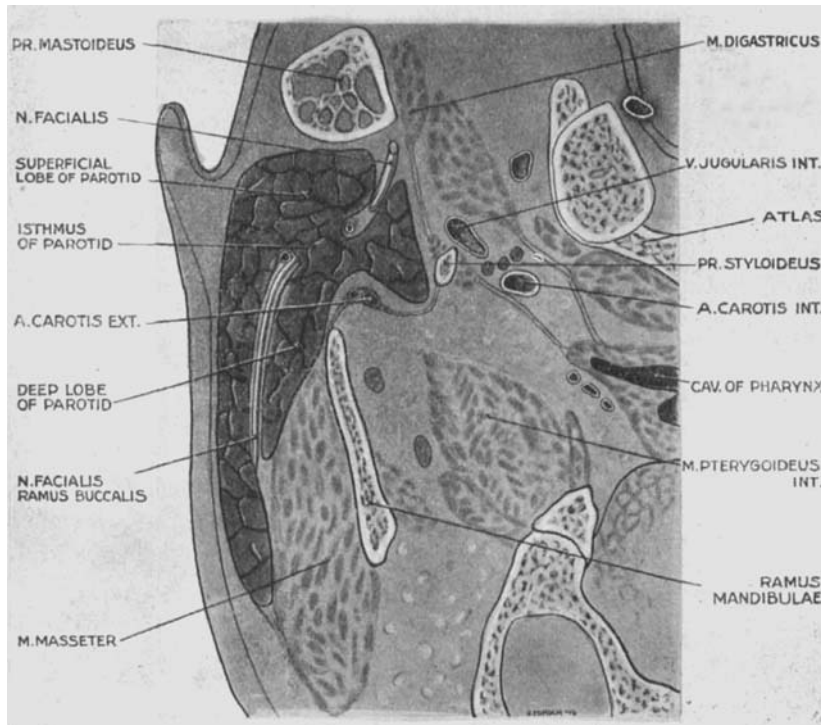


Fig. 2 Horizontal section of the head in the parotid region (semidiagrammatic) to show the relations of the superficial and the deep lobe of the parotid. The two lobes are shown separated by branches of the facial nerve, except in the region of the isthmus.

in a variable manner. Each lobe has usually a main terminal duct, which, however, sometimes receives minor branches from the other lobe. A duct draining part (or exceptionally all) of either the superficial or the deep lobe may cross the isthmus to join the duct of the opposite lobe. Small branches from either

(especially the superficial) lobe may also join the main parotid (Stenson's) duct (fig. 1).

The facial nerve trunk and its main branches lie between the superficial and the deep lobe of the parotid gland (figs. 1 and 2). These lobes are not united at their upper extremities (Λ -shaped), however, with all the nerve branches below the junction of the lobes, as described by Grégoire. The two lobes are united rather in H-shape, the connecting isthmus corresponding to the cross-bar (fig. 2). Upon approaching the isthmus of the gland from behind, the facial nerve divides into its upper (temporo-facial) division, which passes forward above the isthmus, and its lower (cervico-facial) division, which passes below the isthmus (fig. 1). The uppermost and lowermost facial branches may not come into contact with the deep lobe (on account of its small size), though still under cover of the superficial lobe of the parotid. The facial branches lie between the two lobes, sometimes infolded in grooves on the opposing surfaces. Rarely are they entirely surrounded by the gland parenchyma. In the neighborhood of the ducts, the nerve branches lie superficial to those ducts more closely associated with the deep lobe and beneath (internal to) those ducts more closely associated with the superficial lobe. Thus the relations of nerves and ducts are quite variable; but in no case were all of the ducts from the deep lobe observed to pass upward and outward, above all the facial nerve branches, as described by Grégoire. The relations found are therefore not in agreement with Grégoire's theory of the development of the parotid lobes.

In general, since the relations found in the dissections of the late fetus and newborn were essentially similar to those above mentioned for the adult, no separate description of the former is necessary. In one full term fetus of 50 cm., the two lobes were nearly equal in size, but the deep lobe was usually found to be much the smaller. It should be noted, however, that no observations were made upon younger fetuses, to determine the developmental relations.

In conclusion, the results of my investigation may be summarized briefly, as follows: The human parotid gland (late

fetal, newborn and adult) consists of a larger superficial and a smaller deep lobe, usually distinct and readily separable, with separate ducts. The facial nerve and branches lie between these lobes. The lobes are usually joined (not at their upper ends but lower down) by an isthmus separating the temporo-facial and the cervico-facial divisions of the facial nerve. The relations found are not in agreement with Grégoire's theory of the development of the parotid lobes.

LITERATURE CITED

- GRÉGOIRE, R. 1912 Le nerf facial et la parotide. *Journal de l'anatomie et de la physiologie*, T. 48, p. 437-447.
- HENLE, J. 1873 *Handbuch der systematischen Anatomie des Menschen*. Bd. 2. *Eingeweidelehre*. Zweite Aufl. Braunschweig. (Die Parotis, S. 139).
- HENLE-MERKEL. 1901 *Grundriss der Anatomie des Menschen*. 4 Aufl. Text. Braunschweig. (Gl. Parotis, S. 240.)
- LUSCHKA, H. 1862 *Die Anatomie des Menschen*. Bd. I, Abth. I, (Die Parotis, S. 183-185). Tübingen.
- 1867 *Die Anatomie des Menschen*. Bd. III, Abth. II, (Die Parotis, S. 311-315). Tübingen.