On the Terminal Branches of the Facial Nerve in *Macacus cyclopsis*

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The so-called facial muscles of the *Macacus cyclopsis* are all supplied by the N. facialis. The N. facialis, immediately after emerging from the Foramen stylomastoideum, sends off the N. auricularis posterior upward and posteriorly and the R. digastricus forward after which the main trunk continues into the parotid gland where it separates into the R. temporofacialis and the R. cervicofacialis which separate further into small branches that distribute to the facial muscles. The most common type of distribution of the N. facialis was that in which there was anastomosis between only the branches of the R. temporofacialis or that in which there were more than two communicating branches between the R. temporofacialis as well as one anastomosing branch from the R. cervicofacialis. The findings for *Macacus cyclopsis* are not much different from that for Gorilla, Chimpanzee, Rhesus monkey, etc., but the condition can not be said to be simple in all aspects as compared with Orang.

In a previous report, SHIBATA (1959) presented the findings on the facial muscles of the *Macacus cyclopsis* but the pattern of distribution of the N. facialis which supply these facial muscles was not discussed. In the present paper are presented the results of our observation conducted principally on the state of the terminal branches of the N. facialis to the face. The material for this study consist of adult *Macacus cyclopsis* from the collection of Prof. SATOH. From among these specimens, 32 cadavers (♂ 14, ♀ 18) without evidence of deformity, damage, etc. were selected and each side of the face, for total of 60 cases, were inspected with the aid of a binocular loupe.

FINDINGS AND CONSIDERATION

The nerve supplying the superficial muscles (muscles of expression) of the face is the N. facialis. The N. facialis immediately after leaving the Foramen stylomastoideum gives off the N. auricularis posterior which runs upward and posteriorly parallel with the A. auricularis posterior to supply the auricle and the muscles of the occipital region and the R. digastricus which runs forward and downward to supply the M. digastricus, M. stylohyoideus, etc. After giving off these branches, the main trunk enters the parotid gland where it branches out to form a fine, intricate network, the terminal branches of which run to the facial muscles. Generally, it divides into two major branches; the R. temporofacialis and the R. cervicofacialis. The former further sends off the Rr. temporales, Rr. zygomatici and Rr. buccales while the latter gives off the R. marginalis mandibuleae and the R. colli. Furthermore, the branches of the R.
temporofacialis anastomose intricately with each other and, in particular, a nerve plexus is formed on the lateral surface of the M. masseter and on the cheek.

1. R. temporofacialis

a. Rr. temporales The N. facialis, after emerging from the Foramen stylomastoideum, sends off the Rr. cervicofacialis which supplies the mandibular and cervical regions. It then continues forward for a short distance and separates into Rr. temporales which passes upward and anterior to the auricle, the Rr. zygomatici which continues to the buccal region, and the Rr. buccales which runs downward. Within the parotid gland, the Rr. temporales, after separating from the Rr. zygomatici and Rr. buccales, separate into one to five further branches which issue from the upper edge of the parotid gland, cross over the zygomatic bone, and run upward in front of the ear to supply the muscles of the temporal and frontal regions and, in particular, the muscles in the area above and lateral to the orbital fossa. There is simple communication between the nerves which is not marked enough to be called a network. Anastomosis with the Rr. zygomatici also is frequently noted as well as communication with the N. auriculotemporalis and R. zygomaticotemporalis.

b. Rr. zygomatici and Rr. buccales The main trunk after giving off the Rr. temporales usually separates into three or five branches which run forward from the parotid gland but in general the Rr. zygomatici and the Rr. buccales are difficult to distinguish. These branches, which are located above or below the parotid duct, run parallel with this duct and in some of the cases encircle the A. transversa faciei. Furthermore, in most of the cases, they form an intricate plexus near the V. facialis anterior and run to the facial muscles of the upper lip, buccal region, zygomatic region, and infraorbital region. At the terminal region, anastomosis with the N. infraorbitalis is noted.

2. R. cervicofacialis

This is a large nerve which runs downward from the parotid gland and consists of one or two branches, but it most frequently is a single branch and in the vicinity of the angle of the mandible it gives off the R. marginalis mandibulae to the mental region and the R. colli which runs to the neck.

a. R. marginalis mandibulae This branch runs downward beneath the Platysma and runs forward from the angle of the mandible along the lower edge of the body of the mandible to the muscle of the mental region, but during its course branches are sent to the M. buccinator, the angle of the mouth and the lower lip.

b. R. colli The R. colli after separating from the main trunk runs downward to enter into the Platysma. Separation of the R. marginalis mandibulae and R. colli occurred at near the bifurcation of the two major branches in 16 cases (27%), at near the angle of the mandible in 21 cases (35%) and about midway between the these two places in 20 cases (33%). There was one case in which the R. marginalis mandibulae and R. colli both arose separately from the trunk of the N. facialis and there were two cases in which in addition to the separate origin of the R. marginalis mandibulae and R. colli from the trunk of the N. facialis there was also a branch from the R. marginalis mandibulae which supplied the Platysma in the cervical region.

The R. marginalis mandibulae and the R. colli of the R. cervicofacialis are given off separately from the main trunk parallel with each other in Gorilla. In contrast to
this in Chimpanzee they arise by a single stem which later separates into the R. marginalis mandibulae and the R. colli (Ruge\textsuperscript{99}). In Rhesus monkey the R. colli separates from the R. marginalis mandibulae as in Chimpanzee (Huber\textsuperscript{3}, \textsuperscript{4}). Consequently, the condition in Macacus cyclopis is generally the same as in Rhesus monkey\textsuperscript{3} and Chimpanzee, but in rare cases the condition seen in Gorilla or the mixed type between Gorilla and Chimpanzee are found. Also, in the terminal region there is anastomosis with N. mentalis.

3. The general state of ramification and anastomosis of these terminal branches of the N. facialis within the parotid gland was classified according to the classification of McCormack\textsuperscript{6} for man. The most common conditions in Macacus cyclopis were that in which there is anastomosis only between the branches of the R. temporofaciales (type II, 40\%) and that in which there are more than two communicating branches
between the Rr. temporales as well as one anastomosing branch from the R. cervicofacialis (type V, 51%). However, very rarely there were cases in which branches were sent off successively from the main trunk and classification into the various nerve groups could not be made (2%). Also in five cases, the main trunk of the nerve encircled the artery before separating into the superior and inferior branches while in four cases a very small twig separated from the main trunk immediately after emerging from the Stylomastoid foramen and joined the main trunk again later with the artery bound in between.

4. The results of the examination of the terminal branches running toward the face from the edge of the parotid gland were compared with the results of Takahashi9 for the Japanese. In this comparison, the Rr. colli are excluded. The number of branches from the edge of the parotid gland ranged from four to twelve, with seven to nine branches in the majority of cases. This is not much different from the condition in man.

5. Next, the combination of the number of branches in the Rr. temporales, the Rr. zygomatici and buccales, and the R. marginalis mandibulae, respectively, was studied. The combinations of 2-3-1, 2-4-1 and 4-4-1 were most common being seen in five cases each among the 60 cases. Of the combinations in the number of branches in each group, the Rr. zygomatici and buccales was the greatest in number, followed by the Rr. temporales and the R. marginalis mandibulae in this order in 48% of the cases. The former two groups were equal in the number of branches with a small number of branches in the last group in 22%. This relation is similar to the state in man. However, the course of the terminal branches of the N. facialis, as a whole, is different from that of man in that there are very few cases in which the Rr. zygomatici and Rr. buccales run downward.

6. The findings in the terminal divisions of the N. facialis in Macacus cyclops have been presented above. There is little difference from the condition in Gorilla, Chimpanzee, Rhesus monkey, etc. In general, the N. facialis is complicated in man and Orang and is said to decrease in complexity in the order of Gorilla and Chimpanzee (Sonntag8, Ruge9). However, according to my findings, the relation between the branches of the R. marginalis mandibulae and R. colli of the R. cervicofacialis, as well as the presence of anastomosis between the N. auriculotemporalis and the N. facialis which is reported to be absent in Orang (Frohse2) indicates that the distribution of the N. facialis in the Formosan monkey is not necessarily simple.

REFERENCES