Topography and branching patterns of the great auricular nerve

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부족함이 많은 저에게 아낌없는 관심과 애정으로 지도해주신 김 희진 교수님께 가장 먼저 감사드립니다. 석사학위 연구과정에 있어 많은 조언과 가르침으로, 때론, 의지할 수 있는 따듯한 큰 형처럼 대해 주신 교수님의 마음 소중히 간직 하겠습니다. 앞으로 학문과 삶에 대한 교수님의 진심어린 말씀 하나하나 새겨가며 최선을 다해 살겠습니다.

처음부터 많은 배려를 해주신 정 한성 교수님, 궂은 일을 마다 않고, 모든 면에서 도와주신 허 경석 교수님께 감사의 마음을 전합니다. 연구와 강의로 바쁘신 와중에도 저의 학위논문 심사를 흔쾌히 맡아 주시고, 세심한 지도와 조언을 아끼지 않으신 이 승일 교수님과 김 형준 교수님께도 감사드립니다.

또한, 교정임상를 지도해 주시고, 뿐만 아니라 저에게 좋은 인연을 만들어 주신 김 태원 외래교수님께도 항상 감사를 드립니다. 지치고 힘들 때마다 저에게 큰 힘이 되어주신 심 경섭 선생님이하 대학원생 선후배분들께도 진심으로 감사를 드립니다.

마지막으로 제가 치과의사로서의 길을 걷게 해주신 사랑하는 부모님께 부끄럽지 않도록 최선을 다해 열심히 살아가겠습니다. 가장 많이 기뻐해 줄 아내 지수와 아들 병주, 딸 연주와 함께 다시 한 번 모든 분들께 머리 숙여 감사를 드립니다.

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ABSTRACT

Topography and branching patterns of the great auricular nerve

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The great auricular nerve (GAN) is the largest nerve of the four cervical cutaneous nerve which encircle the posterior border of the sternocleidomastoid muscle (SCM). It distributes to the facial skin over the parotid gland, parotid gland and the back of the auricle. The GAN is frequently used as a donor site, due to the easy and the nerve is relatively large. However, when parotidectomy, rhytidectomy and platysma flap operation are performed, the GAN is often sacrificed. Transection of the nerve results in a wooden numbness of preauricular region, pain and neuroma. Recently, much effort has been given to save the GAN in operations of the para-auricle lesion. However, the exact pathways of GAN as well as its relation to surrounding structure are still imprecise. Therefore, the purposes of this research provide basic data of GAN as donor nerve and clear branching pattern and distribution area of GAN. Twenty-five embalmed, adult hemifacial Korean cadavers (16 males, 9 females; average age 62.5 years) were used in this study.

In all cases, the GAN located behind the external jugular vein. The GAN was divided into anterior branch and posterior branch. The anterior branch distributed parotid gland and the posterior branch distributed auricle. The anterior branch is again divided into superficial branch which is extended to skin and deep branch which enters parotid gland. We classified five types as the this branching pattern of GAN. TypeⅠ which is described in textbooks as typical pattern was 20.0% (5/25). TypeⅡ, in which all branches are divided at the same point was 24.0% (6/25). TypeⅢ, in which a deep branch arise from the posterior branch was 28.0% (7/25). Type Ⅳ, in which a superficial branch arose from the posterior branch was 8.0% (2/25). Type Ⅴ in which both anterior and posterior branches run independently was 20.0% (5/25). In all cases, a connection of GAN and facial nerve trunk was observed. In few cases, a connection with auriculotemporal nerve was observed. A histological structure of GAN was observed after excising it from two regions (proximal : a region where GAN appears at the posterior border of SCM, distal : a region where GAN is divided into three branches.). The total fascicles area of both region was decreased as it moves from proximal region (1.42㎟) to distal region (0.60㎟). The number of fascicles of proximal and distal region was 2.5 and 5, respectively.

In conclusion, these results could would provide a great help in preserving the GAN during operation of parotid gland region, and the GAN would be good donor site in nerve graft.

Key words: great auricular nerve, parotidectomy, nerve graft, facial nerve, nerve communication

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I. INTRODUCTION

The cervical cutaneous nerves from the cervical plexus, emerge through the superficial cervical fascia as four distinct nerves on the posterior border of the sternocleidomastoid (SCM) muscle. These cervical cutaneous nerves are known to involve sensation from the antero-lateral cervical skin (Pansky 1992, Woodburne and Burkel 1994a, Kim et al. 2002, Standring et al. 2005, Moore and Dalley 2006).

The great auricular nerve (GAN) is the largest branch of the four cervical cutaneous nerve. It also emerges through the superficial cervical fascia on the posterior border of the SCM, and distributes to the mandibular angle, the skin of parotid gland, parotid gland, the skin of auricle (Ginsberg and Eicher 2000).

The GAN serves as a good donor nerve because it is easily accessible due to the location beneath the platysma and it has no need to perform the additional surgery during a nerve graft surgical procedure of the head and neck region. In addition, due to the relatively large cross section area, the GAN is frequently used in replacing the facial nerve, inferior alveolar nerve, and accessory nerve (Eppley and Snyders 1991, Fisch and Lanser 1991, Shultz et al. 1992, Rayatt et al. 1998, Koshima et al. 2004, Guo et al. 2005).

When performing the parotidectomy and rhytidectomy, the resected portion is closely related to distributing area of GAN and this neve is often sacrificed during the surgery. However, after the injury of GAN, the loss of sensation, pain, Tinel's sign, and neuroma are often encounterd. In this reason, there has been many efforts to preserve the GAN. For the preservation of GAN, the surgeons have to know the exact courses, surrounding structures, and distributing area (Izquierdo et al. 1991, Moss et al. 2000, Biglioli et al. 2002, Maimone-Baronello et al. 2003, Nusair and Dickenson 2003).

The purposes of the studies were to determine the branching patterns of GAN, the topographic relations to the other structures to provide the critical data during the surgical procedures. Furthermore, we performed this study to elucidate the histomorphometric characteristics of GAN for the nerve graft.

II. MATERIALS AND METHODS

A total of 25 sides of formalin-fixed necks from Korean cadavers (11 bilateral specimens, 3 unilateral specimens) were used in this study. The subjects included 16 males and 9 females, with an average age was 62.5 years. To study the precise course of GAN and the extent of its innervation and communication, cadavers that had no history of trauma or any surgical procedures on the face and neck were used.

The dissections were performed in oblique lateral position. After dissection of the whole dermal layer from the neck to the face, the parotid fascia and the superficial cervical layer were exposed. Especially, the cervical cutaneous nerves were carefully dissected, and sketches were drawn with special attention paid to the course of GAN on the SCM muscle. Along with the couse of GAN, the nerve branches were exposed clearly, and the dissections were performed to identify the fine nerve branches of GAN on the parotid fascia and nerve branches to the auricle.

On the other hand, after the skin was removed on the anterior and posterior aspect, the fine nerve branches from GAN were identified. Also, we tried to find out the distribution area of GAN to the auricle through the dissection.

At the parotid region, the parorotid parenchymes were removed and further dissection proceeded. Through the dissection at this region, the facial nerve trunk and its divisions was identified and the fine terminal nerve branches from GAN were also exposed. In this investigation, the communicating nerve twigs among the nerve branches of GAN, the facial nerve and the nerve branches of the trigeminal nerve. All the microdissections were performed under the surgical microscope (OPMI, Zeiss Co., Germany).

To obtain histological sections, we harvested the intraparotid terminal nerve branches of GAN including the facial nerve trunk from the five specimens. And the nerve specimens at the emergence spot on the posterior border of the SCM (the promimal region of GAN) and at the region prior to the furcation spot of GAN on the SCM (the distal region of GAN) were obtained for the hisotomorphometric analysis from the ten dissected specimens. These specimens were postfixed for 72h with 4% paraformaldehyde and then embedded in paraffin wax. Transverse 5-μm-thick sections were mounted on glass slides, and then stained with hematoxylin-eosin and Luxol fast blue. Histological observations were performed with the aid of a light microscope, and photographs were taken.

No distinction was made between the male and female cadavers. All photographs and diagrams in this article are of structures viewed from the left side of the specimen.

III. RESULTS

Branching patterns and topographic relationships of the GAN

In all cases of the specimen, the GAN ascended toward the parotid gland from the posterior border of the SCM. In terms of the topographic relationship with the surrounding structure, GAN was emerge from posterior border of the SCM and it located behind the external jugular vein in every case.

On the SCM, GAN was divided into the anterior and posterior branches. The anterior branch was divided again into the superficial and deep branches.

The superficial branch distributed to skin and surface of the parotid gland. The deep branch was entering the parenchyme of the parotid gland. With the references of these nerve branches, we classified the branching patterns of GAN into five categories (Fig. 1).

The type Ⅰ was defined that the nerve is divided into the anterior and posterior branch, and the anterior branch was bifurcated into the superficial and deep branches (Fig. 1A). This category is described in the most anatomy textbooks, but it was only observed in 5 cases of the specimens (20%).

The type Ⅱ was observed in 6 cases of the specimens (24%). In this pattern, the GAN was trifurcated at the same spot (Fig. 1.B). Type Ⅲ was the cases that the deep branch originated form the posterior branch of GAN (Fig. 1C). It was most frequently observed shown in 7 cases of the specimens (28%). Whereas, in TypeⅣ, the superficial branch was arisen from the posterior branch of GAN in 2 cases of the specimens (8%) (Fig. 1D).

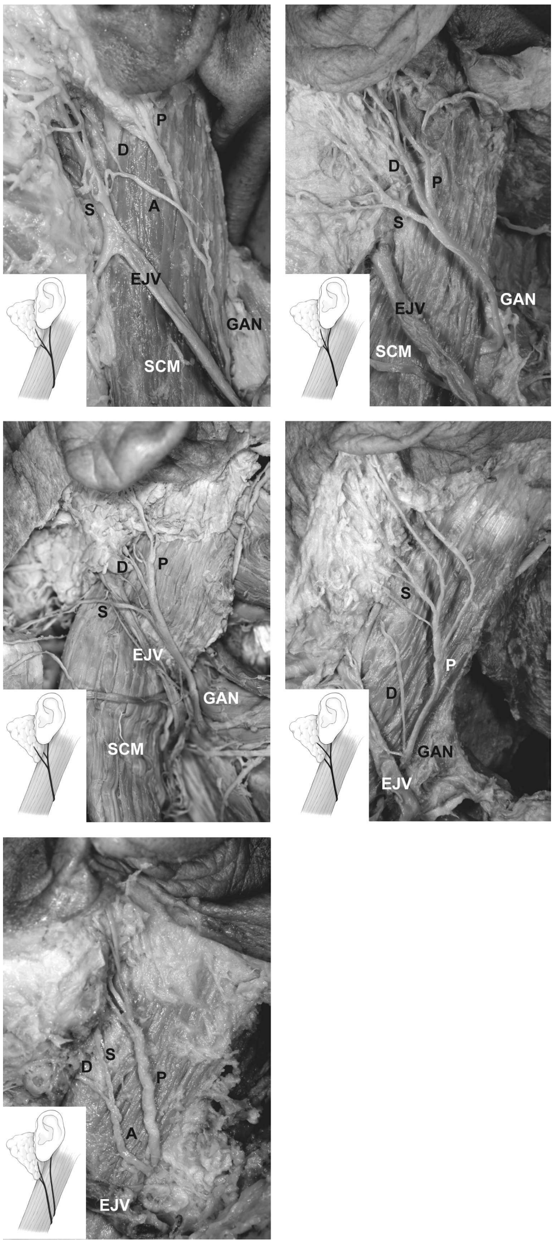

Fig. 1. Five branching patterns of the greater auricular nerve (GAN). A : anterior branch, P : posterior branch, S : superficial branch, D : deep branch, SCM : sternocleidomastoid muscle, EJV : external jugular vein

The last category, the Type V showed that GAN was running on the SCM with the separate branches; the anterior and posterior branches, when it emerged through the superficial cervical fascia (Fig. 1E). It was found in 5 cases of the specimens (20%).

The distribution areas of the superficial branch of GAN were dissected and examined. These nerve branches were running upward from the mandibular angle and they distributed to the parotid gland and the skin covering this region. The superficial branch from GAN was located on the superficial fascia of the parotid gland and ran toward the anterior margin of the parotid gland. The fine terminal nerve twigs of the superficial branch of GAN were extended to the surface of the masseter muscle and its fascia (Fig. 2).

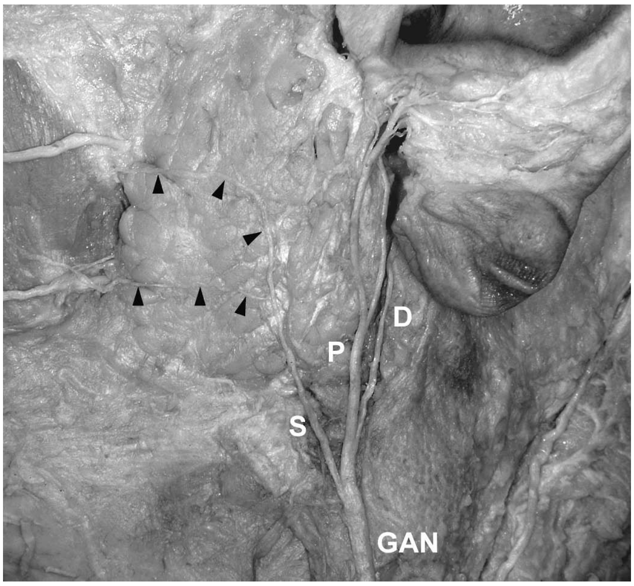

Fig. 2. The distribution area of the superficial branch. Arrowheads indicate superficial branches. P : posterior branch, S : superficial branch, D : deep branch, GAN : great auricular nerve

On the other hand, a relatively small nerve twigs from the deep branch of GAN distributed to the deep layer of parotid gland. The main branches from the deep branch of GAN were ascending and running toward the auricle and distributed to the posterior aspect of the auricle (Fig. 3A).

In general, it is known that the deep branch of GAN distributed to inferior part of the ear. However in 20 cases of the specimens in this study (80%), it also supplied in the middle of the posterior aspect of the auricle (Fig. 3B). In 5 cases of the specimens (20%), the deep nerve branches distributed the middle and upper portion of the posterior aspect of the auricle (Fig. 3C).

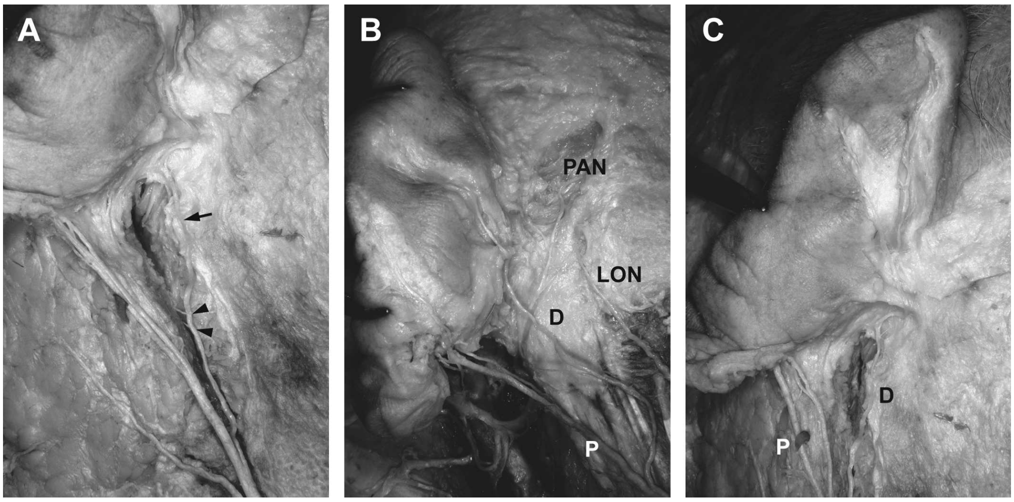

Fig. 3. The distribution area of the deep branch of great auricular nerve. Arrow indicates the deep branch. Arrowheads indicate a point where the deep branch entered into parotid gland. P : posterior branch, D : deep branch, LON : lesser occipital nerve, PAN : posterior auricular nerve

Most of the posterior branches were also distributed to the anterior surface of the ear (Fig. 4). These nerve branches was divided into two branches below the level of the lobule, two nerve branches (superficial and deep subbranches) entered the auricle above the otobasion inferius (Fig. 4A). After these nerve branches entered above the otobasion inferius, the superficial nerve subbranches ran horizontally and ascended through groove between the helix and antihelix above the ear cartilage. On the other hand, the deep nerve subbranches divided into two separate nerve twigs, upper nerve twig ascended and distributed to the inferior 2/3 of the auricle below the ear cartilage. The other lower nerve twig from the deep nerve subbranches distributed at the ear lobule (Fig. 4B).

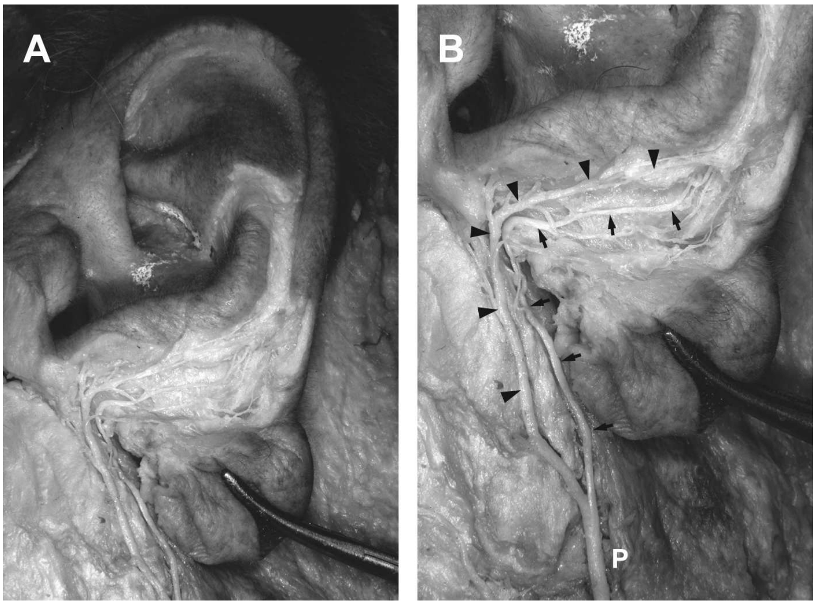

Fig. 4. The distribution area of the posterior branch (P) of great auricular nerve. Arrows indicate the deep nerve subbranches. Arrowheads indicate the superficial nerve subbranches.

In this study, we observed the unique findings on the nerve communication between the GAN and the facial nerve trunk. In every case of the specimens, the deep branch of GAN communicated with facial nerve trunk (Fig. 5A). In a rare case, the deep branch of GAN communicated with the posterior auricular nerve, and the anterior branch communicated with the auricular temporal nerve simultaneously (Fig. 5B).

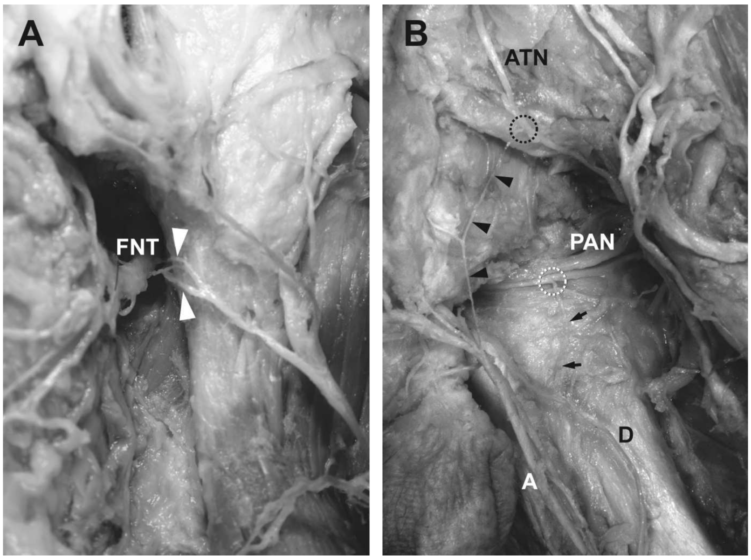

Fig. 5. The communication between GAN and facial nerve. The white arrowheads indicate the deep branch of the GAN which meets facial nerve trunk. The black arrowheads indicate the small branch of the anterior branch which meet auricular temporal nerve (ATN). The black arrows indicate the small branch of the deep branch which meet posterior auricular nerve (PAN). A black dotted circle indicates point where deep branch meet ATN. A white dotted circle indicates point where deep branch meet PAN. A : anterior branch, D : deep branch, FNT : facial nerve trunk.

Histomorphometric charateristics of GAN.

Nerve specimens were harvested at the proximal (emergence point on the posterior border of the SCM) and distal region (region prior to the furcation spot into the anterior and posterior branches) along with the course GAN.

The average fascicular number was 2.5 (1 ~ 4) at the proximal region of GAN and 5 (2 ~ 8) at the distal region, respectively. In terms of the total fascicular area, It was 1.42 mm^2 (0.84 ~ 1.75mm^2) at the proximal region of GAN and 0.6 mm^2 (0.54 ~ 0.64mm^2) at the distal region. From the poximal to the distal aspect along the course of GAN, the total fascicular number of the nerve increased, whereas the total fascicular area decreased (Fig. 6, Table 1). Therefore, an average fascicle area of proximal (0.57mm^2) and distal region (0.12mm^2) showed a big difference.

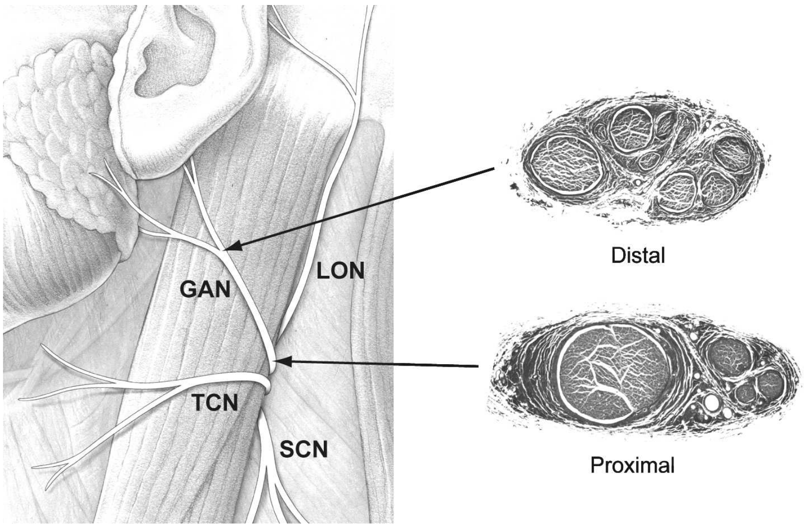

Fig. 6. Histologic findings of GAN. GAN : great auricular nerve, LON : lesser occipital nerve, TCN : transverse cervical nerve, SCN : supraclavicular nerve.

Table 1. The metric value of the histologic findings of GAN

	Fascicular number	Total fascicular area
Proximal	5 (2 - 8)	0.6mm^2 (0.54 - 0.64)
Distal	2.5 (1 - 4)	1.42mm^2 (0.84 - 1.75)

IV. DISCUSSION

Details of cervical cutaneous nerves have been treated with little interest due to the relative unimportance of clinical applications. Likewise, a detailed description of the patterns of the cervical cutaneous nerves is not available either in the literature or in anatomy textbooks.

In this study, we observed that GAN divided into three branches (superficial, deep, and posterior branches) unlike other descriptions in the literatures. The typical cases that GAN divided into the anterior and posterior branches in which described in anatomy textbook (Standring et al. 2005) were only observed in 20% of the cases in this study. In contrary, the cases that the deep branch originated form the posterior branch of GAN (Type III) were most observed in 28% of the cases.

Most anatomy textbooks describe that the anterior branch of GAN distributes the skin overlying the parotid gland, and the posterior branch of the this nerve distributes the posterior surface of the ear, ear lobule, skin overlying mastoid process (Pansky 1992, Woodburne and Burkel 1994a, Standring et al. 2005, Moore and Dalley 2006). In other word, the anterior branch of GAN is defined as the nerve distributing the anterior facial skin in the reference with the auricle.

In this study, the nerves distributing the anterior facial skin were divided into two branches; the superficial and deep branches. However, the superficial and deep branches were originated from GAN in various ways (Type I ~ V). Among these categories, the superficial branch was originated from the anterior branch of GAN in 10 cases of the specimens (40%). In this pattern, it was observed that the superficial branch was originated from the separate anterior branches on the SCM (Type V, 5 cases). The others were the cases that directly originated from GAN in 15 cases (60%). Therefore, it was not clear of the distinct division between the anterior and posterior as shown in the anatomy textbooks (Pansky 1992, Woodburne and Burkel 1994a, Standring et al. 2005, Moore and Dalley 2006). This superficial branch were supplying the superficial facial skin above the parotid fascia anterior to the auricle.

In terms of the deep branch, a small nerve branch divided into two or three small nerve twigs on the posterior margin of the parotid gland and it was running deep to the parenchyme within the parotid gland. Its branching patterns were similar to the superficial branch in which it was originated from the anterior branch (10 cases, 40%) and directly from the GAN (15 cases, 60%), respectively.

When parotidectomy and rhytidectomy were performed, other nerves (GAN, auriculotemporal nerve, etc.) were removed except facial nerve because of the longer surgery time and the insufficient anatomic knowledge. Recently, much effort has been given to preserve GAN for reducing many post-op complications at the para-auricular region (Izquierdo et al. 1991, Moss et al. 2000, Biglioli et al. 2002, Maimone-Baronello et al. 2003,Nusair and Dickenson 2003). In this study, the GAN is always located posterior to the external jugular vein. Therefore, the surgical approach should be done from the posterior aspect to the external jugular vein in order to preserve GAN when performing the surgical procedure around the parotid gland.

When the GAN is removed inevitably during the parotidectomy, it is thought that three branch (superficial, deep, posterior branch) from GAN could be removed selectively, not the whole branches of GAN. This surgical technique would be useful to minimize the post-op complications after parotidectomy.

In general, it is known that the inferior part of the posterior aspect of the auricle is distributed by GAN, and the superior and middle part is distributed by the lesser occipital nerve. However, we observed that the middle and inferior part of the posterior aspect of the auricle was distributed by GAN in every case. Moreover, whole posterior aspect of the auricle was distributed by GAN only in 20% of the specimens. In these cases, the lesser occipital nerve only distributed at the lateral part of the occipital region posterior to the auricle.

When a nerve graft procedure performs for a damaged facial nerve and the other trigeminal nerve branches, GAN is the first choice of donor nerve to be considered due to the easy access and the large cross section area (Rayatt et al. 1998). In nerve graft, the total fascicular area of the donor nerve is always larger than that of the recipient nerve. Each total fascicular area of five branches (temporal, zygomatic, buccal, marginal mandibular, cervical branch) of the facial nerve was approximately $1.00mm^2$ (Lineaweaver et al. 1997, Asaoka et al. 1999). In this study, the total fascicular area of GAN was $1.42mm^2$ at proximal and $0.61mm^2$ at distal stump along with the course of GAN. The total fascicular area was decreased as it goes from the proximal to the distal aspect. Therefore, it is reliable to approach from the adjacent region of SCM when the nerve graft is done with GAN.

The GAN communicates with several cranial nerves in the following manners: the nerve branch from GAN sends a small nerve twig (or several small twigs) into the parotid parenchyme and connect the facial neve, the auricular branch of the vagus nerve and the posterior auricular nerve of the facial nerve (Standring et al. 2005). In this study, the deep branch from GAN gave off a small twig (or several small twigs) to communicate with facial nerve trunk in every case. Like the way this communication between sensory nerve (GAN) and motor nerve (facial nerve), there are some reports (Martin and Helsper 1957, Last 1984, Namking et al. 1994, Woodburne and Burkel 1994b, Hwang et al. 2004, Kwak et al. 2004, Standring 2005) where the sensory branches of the trigeminal nerve and the motor branches of the facial nerve (auriculotemporal nerve and upper division of the facial nerve, zygomaticotemporal nerve and temporal branch, zygomaticofacial nerve and zygomatic branch, infraorbital nerve and zygomatic branch, infratrochlear nerve and zygomatic branch, buccal nerve and buccal branch, and mental nerve and marginal mandibular branch of the facial nerve). However, the function of these communications between the sensory and motor nerves has not to be determined yet. It might be that the sensory nerve is in some way involved the convey the proprioception impulses from the muscle innervated by the motor nerve with which it communicates.

In this study, we observed that the superficial branch of GAN communicated with the auricular temporal nerve and deep branch of GAN communicated with the posterior auricular nerve simultaneously in some cases. The communication between the superficial branch and auricular temporal branch was the communication between sensory nerve. However, the communication between the deep branch of GAN and the posterior auricular nerve was communication between sensory nerve and motor nerve branches. The further functional anatomic studies should be done to clarify the nerve communication between peripheral nerves and cranial nerves.

The implications of a more detailed GAN anatomy are applicable to complex approaches to the facial surgery and nerve graft. Recognition of the some interconnections between the other peripheral or cranial nerves within the parotid gland could require reconsideration of the conventional approach to parotid resection. The surgeon may also consider microscopic dissection of the nerve to preserve all branches and connections to be better in itself as well as a strategy for limiting the consequences of partial intraparotid nerve branch resection because of tumor involvement or technical difficulties. Familiarity with these common variations in GAN anatomy is an absolute necessity for careful dissection, preservation of the GAN branches, and complete removal of tumors in parotidectomies.

V. CONCLUSION

We observed that GAN divided into three branches (superficial, deep, and posterior branches) unlike other descriptions in the literatures. The typical cases that GAN divided into the anterior and posterior branches in which described in anatomy textbook were only observed in 20% of the cases in this study. In contrary, the cases that the deep branch originated form the posterior branch of GAN (Type III) were most observed in 28% of the cases. GAN also distributed extensively to parotid gland, facial skin, auricle, lobule, and posterior aspect of the ear.

The total fascicular area was decreased as it goes from the proximal to the distal aspect. The total fascicular area of the proximal GAN is larger than each total fascicular area of five branches (temporal, zygomatic, buccal, marginal mandibular, cervical branch) of the facial nerve. Therefore, it is reliable to approach from the adjacent region of SCM when the nerve graft is done with GAN.

The implications of a more detailed GAN anatomy are applicable to complex approaches to the facial surgery and nerve graft. The surgeon may also consider microscopic dissection of the nerve to preserve all branches. Familiarity with these common variations in GAN anatomy is an absolute necessity for careful dissection, preservation of the GAN branches, and complete removal of tumors in parotidectomies.

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국문요약

큰귓바퀴신경의 국소해부와 분지양상

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큰귓바퀴신경 (great auricular nerve)은 목빗근 뒤에서 나오는 4개의 목피부신경 중 가장 큰 가지로, 턱뼈각 부위, 귀밑샘부위의 피부, 귀밑샘, 귓바퀴 뒷부위의 피부에 분포하는 감각신경이다. 이러한 큰귓바퀴신경은 접근하기가 쉽고, 신경의 단면적이 커서 얼굴신경, 아래이틀신경, 더부신경의 손상시 주는신경 (donor nerve)으로 자주 이용되고 있다. 그러나, 큰귓바퀴신경은 귀밑샘절제술 (parotidectomy), 주름절제술 (rhytidectomy) 등의 수술을 시행할 때, 자주 희생되곤 한다. 수술 후 큰귓바퀴신경이 희생시켰을 경우, 귓바퀴부위의 감각상실, 통증, 신경종 (neuroma) 등 여러 가지 합병증이 나타난다. 그러므로, 최근에는 수술시 큰귓바퀴신경을 살리려는 노력이 많이 시행되고 있으나, 큰귓바퀴신경의 주행과 주위 구조와의 관계는 잘 밝혀져 있지 않다. 따라서 이 연구의 목적은 주는신경으로서 큰귓바퀴신경의 기본적인 자료를 제시하고, 큰귓바귀신경의 나뉨양상과 분포범위를 밝히는 데 있다. 이 연구를 위해 25쪽의 고정된 한국인 얼굴이 사용되었다.

모든 경우에서 큰귓바퀴신경은 목빗근 뒤모서리에서 나와 바깥목정맥에 뒤에서 위쪽으로 주행하고 있었다. 큰귓바퀴신경을 귀밑샘쪽으로 가는 앞가지와 귓바퀴쪽으로 가는 뒷가지로 나누었으며, 앞가지는 피부쪽으로 가는

얕은가지와 귀밑샘속으로 들어가는 깊은가지로 나누었으며, 이러한 3개의 가지를 기준으로 큰귓바퀴신경을 6가지 유형으로 분류하였다. Ⅰ형은 큰귓바퀴신경이 목빗근 위에서 앞가지와 뒷가지로 나뉘고, 앞가지에서 다시 얕은가지와 깊은가지로 나뉘는 유형으로 20.0% (5/25)에서 나타났으며, 대부분의 교과서에서는 큰귓바퀴신경을 이와 같이 설명하고 있다. Ⅱ형은 깊은가지, 얕은가지, 뒷가지가 한 점에서 나뉜 유형으로 24.0% (6/25)에서 나타났다. Ⅲ형은 깊은가지가 뒷가지에서 일어나는 유형으로 28.0% (7/25)에서 나타났다. Ⅳ형은 얕은가지가 뒷가지에서 일어나는 유형으로 8.0% (2/25)에서 나타났다. 큰귓바퀴신경이 목빗근 뒷모서리에서 나올 때부터 앞가지와 뒷가지로 나뉜 Ⅴ형은 20.0% (5/25)에서 나타났다. 또한, 모든 경우에서 큰귓바퀴신경와 얼굴신경의 연결을 관찰 할 수 있었고, 일부경우에서는 귓바퀴관자신경과의 연결도 관찰할 수 있었다. 큰귓바퀴신경이 목빗근을 감싸고 나오는 부위의 신경다발의 면적은 1.42㎟ 이었고, 신경다발수는 5개였다, 이 신경이 2개의 가지로 나뉘는 곳의 신경다발 면적은 0.6㎟, 신경다발수는 2.5개였다. 즉, 가까운쪽에서 먼쪽으로 갈 수록 신경다발면적과 신경다발수 모두 감소하는 경향을 보였다.

이상의 결과는 귀밑샘 주위에 여러 가지 수술을 시행할 때, 큰귓바퀴신경을 보존하는데 도움을 주고, 큰귓바퀴신경을 주는신경으로 사용할 때 기본적인 자료로 이용될 수 있을 것으로 생각된다.

핵심되는 말: 큰귓바퀴신경, 귀밑샘절제술, 신경이식, 얼굴신경, 신경교통