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Anatomical basis of paradoxical masseteric bulging after botulinum neurotoxin type A injection

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Anatomical basis of paradoxical masseteric bulging after botulinum neurotoxin type A injection

Directed by Professor Hee-Jin Kim, D.D.S., Ph.D.

The Doctoral Dissertation submitted to the Department of Dentistry, and the Graduate School of Yonsei University in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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December 2016
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ACKNOWLEDGEMENTS

저는 지금 저의 학문과 인생의 길에서 또 한 고지를 넘고 있습니다. 제가 해부학이라는 학문에 들어서서 지금까지 공부할 수 있게 도와주신 모든 분들에게 감사드립니다. 2006년도 본과 1학년 때의 만남으로 시작하여 지금까지 10년 동안의 인연을 이어오면서 언제나 옆에서 인생의 조언을 해주시고 올바른 학문의 길로 인도해주신 김희진 교수님께 가장 큰 감사를 드립니다. 또한, 저에게 언제나 큰 동반이 되어 주신 허경석 교수님, 김성택 교수님, 김홍중 교수님 그리고 정한성 교수님께 감사의 말씀을 드립니다. 이 논문이 완성되기까지 바쁜 시간과 증에 대한 지식과 경험을 항상 가르쳐 주신 노승오 원장님과 옆에서 힘이 되어 주신 병원의 모든 직원들에게도 감사의 마음을 전합니다. 여러 가지 바쁜 일 중에도 지금까지 6년 동안 함께 지내면서 항상 열심히 하며 자기 일처럼 실험을 도와주신 이형진 선생님과 해부학 교실 모든 조교선생님들에게서 감사의 마음을 전합니다.

끝으로, 제가 대학생이 되어 14년 동안 공부에 전념하여 지금 이 자리까지 올 수 있게 지을 키워주시고 물심양면으로 항상 도와주신 어버지, 어머니께 진심으로 감사드립니다. 항상 옆에서 챙겨주시는 저의 가족인 인광 형님, 인강 형님, 인재 형님께도 감사드립니다. 마지막으로 제가 학문의 길을 계속해서 정진할 수 있도록 힘들 때 늘 같이 있어주신 친구들, 선배님들과 후배님들에게도 감사드리며 이 모든 사람들에게 이 논문을 바칩니다.

2016년 12월

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Abstract

Anatomical basis of paradoxical masseteric bulging after botulinum neurotoxin type A injection

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(Directed by Professor Hee-Jin Kim D.D.S., Ph.D.)

The aim of this study was to determine the detailed anatomical structures of the superficial part of the masseter and to elucidate the boundaries and locations of the deep tendon structure within the superficial part of the masseter.

Forty-four hemifaces from Korean (21 hemifaces, 10 left and 11 right; mean age 79.9 years) and Thai (23 hemifaces, 11 left and 12 right; mean age 68.6 years) embalmed cadavers were dissected to analyze the morphological pattern of the deep tendon. The detailed location of the deep tendon structure of the masseter was measured in 30 of the hemifaces.

1. The tendon structure was located deep in the lower third of the superficial part of the masseter. This was observed in all specimens and was designated as a deep inferior tendon (DIT). The relationship between the masseter and DIT could be classified into three types according to the coverage pattern: type A, in which areas IV and V were covered by the DIT (27%, 12/44); type B, in which areas V and VI were covered by the DIT (23%, 10/44); and type C, in which
areas IV, V, and VI were covered by the DIT (50%, 22/44).

The superficial part of the masseter consists of not only the muscle belly but also the deep tendon structure. Based on the results obtained in this morphological study, we recommend performing layer-by-layer retrograde injections into the superficial and deep muscle bellies of the masseter.

Key words: Masseter muscle, paradoxical masseteric bulging, lower facial contour, deep inferior tendon, Botulinum neurotoxin type A injection
Anatomical basis of paradoxical masseteric bulging after botulinum neurotoxin type A

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I. INTRODUCTION

The masseter is the most powerful jaw-closing muscle of the masticatory muscle group and is more developed in Asians than in Caucasians. Some Asian women in particular are interested in masseter reduction for improving the lower facial contour (Wu, 2010; Park et al., 2003; Wei et al., 2015; Kim et al., 2005), and botulinum neurotoxin type A (BoNT–A) injection has been widely performed in recent years for treating masseteric hypertrophy (Xie et al., 2014; Quezada-Gaon et al., 2016; Lee et al., 2015). BoNT–A injection treatment is known to be a noninvasive and safe alternative therapy to surgical treatment for masseteric hypertrophy (Carruthers et al., 2004). Since BoNT–A treatment was first reported by Moore (1994), several side effects
had been found in numerous anatomical and clinical studies, including swelling, bruising, muscle weakness, and unexpected changes in the facial expression muscles (Kim et al., 2007; Moor et al., 1994).

Various anatomical studies have attempted to determine the most effective BoNT-A injection points and obtain optimal results while minimizing complications. Several of these studies have investigated the intramuscular nerve distribution, the motor nerve entry point of the masseteric nerve into the masseter, and the relationship between the parotid gland and the marginal mandibular branch of the facial nerve (Bae et al., 2014; Kim et al., 2010; Kaya et al., 2014; Hu et al., 2010). However, the rare side effect of paradoxical masseteric bulging after BoNT-A treatment for masseteric hypertrophy has not been investigated in any recent anatomical or clinical studies.

Lee et al. (2012) reported the occurrence of paradoxical masseteric bulging after BoNT-A injection into a hypertrophied masseter (Fig. 1) (Lee et al., 2012). Even though this is a rare sequela, clinical trials focused on its anatomical clarification need to be performed. Therefore, the aim of this study was to determine the detailed anatomical structures of the superficial part of the masseter and to elucidate the boundaries and locations of the deep tendon structure within the superficial part of the masseter.
Fig. 1. Photograph of paradoxical masseteric bulging. (Reproduced with permission from Seo K, Botulinum Toxin for Asians; Seoul Medical Publishing.)
II. MATERIALS & METHODS

1. Materials

This study was performed in accordance with the 1975 Declaration of Helsinki, with the protocols and procedures approved by the Yonsei University Institutional Review Board (approval no. 2-2015-0039). Forty-four hemifaces from Korean (21 hemifaces, 10 left and 11 right; mean age 79.9 years) and Thai (23 hemifaces, 11 left and 12 right; mean age 68.6 years) embalmed cadavers were dissected to analyze the morphological patterns, with 30 of them used to measure the detailed location of deep tendon structure of the masseter.

2. Methods

The skin of the midface was carefully removed, and the superficial musculoaponeurotic system (SMAS), parotid gland, and masseteric fascia were dissected to reveal the entire masseter. The superficial part of the masseter was dissected to expose and observe the morphological patterns and location of the deep tendon structure.

The surface of the superficial part of the masseter was classified into six equivalently sized rectangular areas (designated I to VI) to enable the portion covered by the deep tendon structure to be delineated. Areas I-III and IV-VI were designated as the upper and lower three compartments, respectively. The location of the deep tendon structure was categorized according to its position with respect to these six compartments.

The proportion of the deep tendon structure in the superficial part of the masseter was measured using an image analysis program (I-solution, IMTechnology, Coquitlam, Canada).
### III. RESULTS

The deep tendon structure was located deep in the lower third of the superficial part of the masseter. It was observed in all specimens and was designated as a deep inferior tendon (DIT). The muscle fibers originating from the superficial aponeurosis of the masseter descended and then changed into the DIT that attached to the inferior border of the mandible (Fig. 2).

Fig. 2. Detailed characteristics of the deep inferior tendon (DIT). (A) The DIT was located deep to the superficial muscle belly of the superficial part of the masseter. (B) The muscle fibers originated from the superficial aponeurosis of the masseter muscle, descended, and then changed into the tendon structure attaching to the inferior mandibular border. White arrowheads indicate the muscle fibers that originate from the deep to the superficial aponeurosis of the masseter muscle. A, anterior; S, superior; OOr, orbicularis oculi muscle.
The relationship between the masseter and DIT could be classified into three types according to the coverage pattern: type A, in which areas IV and V were covered by the DIT (27%, 12/44); type B, in which areas V and VI were covered by the DIT (23%, 10/44); and type C, in which areas IV, V, and VI were covered by the DIT (50%, 22/44) (Fig. 3). Thus, the DIT typically covered the lower three compartments of the masseter. Type C (66.7%, 14/21) and type A (39.1%, 9/23) were the most common types in both the Korean and Thai cadaveric specimens.

The proportion of the DIT in the superficial part of the masseter was measured using an image analysis program. The area of the superficial part of the masseter was 22.22±4.2 cm² (mean±SD), and that of the DIT was 4.48±2.2 cm², thereby constituting approximately 22% of the superficial part of the masseter (19% in the Korean cadavers and 25% in the Thai cadavers (Fig. 4).

The DIT arose deep in the superficial aponeurosis of the masseter, ran downward, and then changed into a tendon attaching to the inferior border of the mandible. Another muscle fiber that originated from the zygomatic arch was present deep in the DIT. The middle and deep muscle fibers of the masseter were observed deeper than this muscle fiber. In the deeper part, the periosteum was found attached to the lateral aspect of the mandible (Fig. 5).
Fig. 3. Classification of the DIT. The DIT can be found easily after removing the superficial muscle belly of the superficial part of the masseter. (A) Type A in which the DIT covers areas IV and V. (B) Type B in which the DIT covers areas V and VI. (C) Type C in which the DIT covers areas IV, V, and VI.
Fig. 4. Proportions of the DIT in the superficial part of the masseter. The surface area of the superficial part of the masseter muscle was $22.22 \pm 4.2 \text{ cm}^2$, and the DIT area within the masseter muscle was $4.48 \pm 2.2 \text{ cm}^2$, hence constituting 22% of the superficial part of the masseter.
Fig. 5. Serial dissections of the layered structures of the masseter muscle from superficial to deep. (A) Surfaces of the superficial and middle parts of the masseter. (B) The DIT was exposed after removing the superficial muscle belly and the aponeurosis of the superficial part of the masseter. (C) Another muscle belly was revealed after removing the DIT. (D) The middle and deep parts of the masseter muscle were attached at the lateral surface of the mandible and the periosteum.
IV. DISCUSSION

This is the first anatomical study to propose a mechanism underlying paradoxical masseteric bulging after BoNT-A injection. Based on the observations made in this study, it was hypothesized that a broad tendon structure (i.e., the DIT) located within the superficial layer of the masseter may prevent the spreading of BoNT-A into the entire layer of the superficial muscle belly. This would result in the deeper muscle belly of the superficial masseter usually being paralyzed, and in rare cases bulging of a part of the superficial muscle belly that is unaffected by BoNT-A due to the presence of the DIT. The DIT originated deep to the aponeurosis of the superficial part of the masseter in every case.

The masseter has been previously described as consisting of three layers: superficial, middle, and deep (zygomaticomandibularis muscle) (Kim et al., 2010). The superficial layer has usually been considered to comprise a muscle belly only; however, we found that the superficial layer has quite a complicated structure composing of a deep and broad tendon within the muscle belly in the present study. The organization of the entire masseter was reported in 2000, and those results were generally comparable to those obtained in the present study (Gaudy et al., 2000).

The DIT was located and formed deep to the superficial part of the masseter and broadly attached to the lower third of the mandibular ramus and the inferior border of the mandible (Fig. 4). Moreover, an additional thin muscle belly was observed deep to the DIT, and the insertion of the deep part of the masseter and periosteum was observed underneath this deeper thin muscle layer. Based on our findings, the superficial part of the masseter appears as lamellar structures consisting of the overlapped muscle belly and
deep tendon structure. Thus, the superficial layer to the deep layer of the masseter were organized in the following order: superficial muscle belly of the masseter, DIT, deeper muscle belly, and insertion of the middle and deep parts of the masseter and periosteum (Fig. 6).

Fig. 6. The illustration of the coronal section of the masseter from superficial to deep (SB, superficial muscle belly of superficial part of the masseter; DB, deep muscle belly of superficial part of the masseter; DP, deep part of the masseter; DIT, deep inferior tendon; SaM, superficial aponeurosis of the masseter).
The most common injection-based method for treating masseteric hypertrophy involves injecting BoNT-A either deep into the lower third of the masseter or where it bulges the most (Xie et al., 2014; Kwon et al., 2009; Shim et al., 2010). This method is designed to avoid damage to the facial nerve and the superficial facial muscles such as the risorius and zygomaticus minor muscles, which could result in unexpected changes in facial expression and paralysis of the buccinator and pterygoid muscles (Ahn et al., 2004; Choe et al., 2005; Liew et al., 2008; Park et al., 2003).

The DIT was located in the lower third of the masseter in every case, but its morphology varied slightly between the Korean and Thai specimens. The most common type in the Korean cadavers was type C, which covered areas IV, V, and VI (66.7% of specimens), while type A, which covered areas IV and V (39.1% of specimens), was the most common in the Thai cadavers. These observations imply that the injection techniques applied to Korean and Thai patients need to be modified in order to optimize the treatment of masseteric hypertrophy. Even though type C (areas IV, V, and VI) is the most common type in Koreans, area VI is known to be a vulnerable region since it is covered by the risorius muscle.

Paradoxical masseteric bulging occurs in rare cases after BoNT-A injections into the masseter (Lee et al., 2012), and has been discussed only anecdotally in the clinical field, with no detailed anatomical information available about the fundamental underlying cause. The current results show clearly that the DIT can prevent the toxin from spreading into the entire superficial masseter during the BoNT-A injection procedure. That is, the DIT acts as a window within the superficial masseter that can confine the injected toxin to within the deeper muscle belly.

Ultimately, the superficial part of the masseter consists of not only the muscle belly but also the deep tendon structure. Considering that the deep
tendon structure was present in every specimen of the present study, physicians should be aware of this tendon prior to treating masseteric hypertrophy and improving lower face contouring using BoNT-A injections. Knowledge of this critical anatomical information will help to prevent paradoxical masseteric bulging. Based on the results obtained in this morphological study, we recommend performing layer-by-layer retrograde injections into the superficial and deep muscle bellies of the masseter (Fig. 6).
V. CONCLUSION

The conclusions of this study are as follows.

1. The superficial layer of masseter muscle has quite a complicated structure composing of a deep and broad tendon within the muscle belly. This tendon was designated as a deep inferior tendon (DIT). The DIT originated deep to the aponeurosis of the superficial part of the masseter in every case.

2. The DIT was located and formed deep to the superficial part of the masseter and broadly attached to the lower third of the mandibular ramus and the inferior border of the mandible. The superficial part of the masseter appears as lamellar structures consisting of the overlapped muscle belly and deep tendon structure.

3. The superficial layer to the deep layer of the masseter were organized in the following order: superficial muscle belly of the masseter, DIT, deeper muscle belly, and insertion of the middle and deep parts of the masseter and periosteum.

4. Layer-by-layer retrograde injections into the superficial and deep muscle bellies of the masseter are recommended to prevent paradoxical masseteric bulging.
REFERENCES

Ahn J, Horn C, Blitzer A: Botulinum toxin for masseter reduction in Asian patients. *Arch Facial Plast Surg* 6: 188-191, 2004.

Bae JH, Choi DY, Lee JG, Seo KK, Tansatit T, Kim HJ: The risorius muscle: anatomic considerations with reference to botulinum neurotoxin injection for masseteric hypertrophy. *Dermatol Surg* 40: 1334-1339, 2014.

Carruthers J, Fagien S, Matarasso SL: Consensus recommendations on the use of botulinum toxin type a in facial aesthetics. *Plast Reconstr Surg* 114: 1s-22s, 2004.

Choe SW, Cho WI, Lee CK, Seo SJ: Effects of botulinum toxin type A on contouring of the lower face. *Dermatol Surg* 31: 502-507, discussion 7-8, 2006.

Gaudy JF, Zouaoui A, Bravetti P, Charrier JL, Guettaf A: Functional organization of the human masseter muscle. *Surg Radiol Anat* 22: 181-190, 2000

Hu KS, Kim ST, Hur MS, Park JH, Song WC, Koh KS, Kim HJ: Topography of the masseter muscle in relation to treatment with botulinum toxin type A. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 110: 167-171, 2010

Kaya B, Apaydin N, Loukas M, Tubbs RS: The topographic anatomy of the masseteric nerve: A cadaveric study with an emphasis on the effective zone of botulinum toxin A injections in masseter. *J Plast
Kim DH, Hong HS, Won SY, Kim HJ, Hu KS, Choi JH, Kim HJ: Intramuscular nerve distribution of the masseter muscle as a basis for botulinum toxin injection. *J Craniofac Surg* 21: 276–281, 2010.

Kim JH, Shin JH, Kim ST, Kim CY: Effects of two different units of botulinum toxin type a evaluated by computed tomography and electromyographic measurements of human masseter muscle. *Plast Reconstr Surg* 119: 711–717 2007.

Kim NH, Chung JH, Park RH, Park JB: The use of botulinum toxin type A in aesthetic mandibular contouring. *Plast Reconstr Surg* 115: 919–930, 2005.

Kwon JS, Kim ST, Jeon YM, Choi JH: Effect of botulinum toxin type A injection into human masseter muscle on stimulated parotid saliva flow rat. *Int J Oral Maxillofac Surg* 38:316–320, 2009.

Lee HH, Kim ST, Lee KJ, Baik HS: Effect of a second injection of botulinum toxin on lower facial contouring, as evaluated using 3-dimensional laser scanning. *Dermatol Surg* 41:439–444, 2015.

Lee SJ, Kang JM, Kim YK, Park J, Kim do Y: Paradoxical bulging of muscle after injection of botulinum neurotoxin type A into hypertrophied masseter muscle. *J Dermatol* 39:804–805, 2012.

Liew S, Dart A: Nonsurgical reshaping of the lower face. *Aesthet Surg J* 28:251–7, 2008.

Moore AP, Wood GD: The medical management of masseteric
hypertrophy with botulinum toxin type A. *Br J Oral Maxillofac Surg* 32:26–8, 1994

Park MY, Ahn KY, Jung DS: Botulinum toxin type A treatment for contouring of the lower face. *Dermatol Surg* 29:477–83, 2003

Quezada-Gaon N, Wortsman X, Penaloza O, Carrasco JE: Comparison of clinical marking and ultrasound-guided injection of Botulinum type A toxin into the masseter muscles for treating bruxism and its cosmetic effects. *J Cosmet Dermatol* 15: 238–244, 2016.

Shim WH, Yoon SH, Park JH, Choi YC, Kim ST: Effect of botulinum toxin type A injection on lower facial contouring evaluated using a three-dimensional laser scan. *Dermatol Surg* 36 Suppl 4:2161–2166, 2010

Xie Y, Zhou J, Li H, Cheng C, Herrler T, Li Q: Classification of masseter hypertrophy for tailored botulinum toxin type A treatment. *Plast Reconstr Surg* 134:209e–18e, 2014

Wei J, Xu H, Dong J, Li Q, Dai C: Prolonging the duration of masseter muscle reduction by adjusting the masticatory movements after the treatment of masseter muscle hypertrophy with botulinum toxin type a injection. *Dermatol Surg* 41: Suppl 1:S101–S109, 2015

Wu WT: Botox facial slimming/facial sculpting: the role of botulinum toxin-A in the treatment of hypertrophic masseteric muscle and parotid enlargement to narrow the lower facial width. *Facial Plast Surg Clin North Am* 18:133–40, 2010
사각턱 치료와 관련한 깨물근 얕은층의 해부학적 구조 및 paradoxical masseteric bulging과 관련한 임상해부학적 고찰

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강 인 원

최근 들어 깨물근 비대 완화를 위한 보툴리눔 독소 치료가 많이 시행되고 있다. 그러나 보툴리눔 독소 치료 후 생기는 깨물근 불거짐 부작용에 대해 정확한 해부학적 근거를 제시한 연구는 부족한 실정이다. 따라서 본 연구의 목적은 깨물근 얕은층의 자세한 해부학적 구조를 관찰하고 얕은층에 위치해 있는 깊은힘줄의 형태 및 위치를 관찰하는 것이다.

한국인 및 태국인 성인시신 44쪽을 해부하였으며 평균나이는 68.6세였다. 이 중 30쪽의 표본에서 깊은힘줄의 위치와 면적을 관찰 및 계측하였다. 깨물근 얕은층에 위치한 깊은힘줄의 해부학적 형태를 구명하기 위해 깨물근의 표면을 균일하게 6등분하여 총 6개 영역으로 나누었으며, 위쪽 3개의 칸은 I, II, III 영역 아래쪽을 IV, V, VI 영역으로 설정하였다. 6등분 한 깨물근 얕은층에서 깊은힘줄의 형태 및 위치에 따라 3가지 유형으로 분류하였다.

모든 표본의 깨물근 얕은층에서 깊은아래힘줄을 관찰하였으며 이 힘줄의 형태를 3가지로 분류하였다. 첫 번째 유형은 깊은아래힘줄이 IV번과 V번 영역을 덮는 형태로, 27% (12/44)에서 관찰되었으며, 두 번째 유형은 V번과 VI번 영역을 덮는 형태로 23% (10/44)에서 관찰되었다. 세 번째 유형은 IV, V, VI 영역을 덮는 형태로 50% (22/44)에서 관찰되었다. 깨물근 얕은층에서 깊은아래힘줄은 약 22%의 면적을 차지하고 있었다.
깨물근 비대 완화를 위한 보툴리눔 독소는 일반적으로 깨물근의 아래 1/3 부위 혹은 가장 튀어나온 부위에 주사되곤 한다. 그러나 본 연구에서 깨물근 얕은층은 단순히 근육힘살로만 이루어진 형태가 아닌 근육힘살과 깊은아래힘줄로 이루어진 층판 구조임을 확인하였다. 새로 관찰된 깊은아래힘줄이 보툴리눔 독소 주사 시 깨물근 얕은층에서 약물의 전반적인 퍼짐을 방해할 것으로 생각되며, 본 연구결과를 토대로, 깨물근의 가장 얕은층에서부터 얕은층까지의 층별 주사가 이루어진다면 깨물근 불거짐 부작용을 예방할 수 있다고 생각한다.

핵심있는 말: 깨물근, 깨물근 불거짐, 아래얼굴윤곽, 깊은아래힘줄, 보툴리눔독신