

# Anatomic Variations Found on Dissection of Depressor Septi Nasi Muscles in Cadavers

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**Objectives:** To define variations of the depressor septi muscle in Iranians; to provide guidance for modification of this muscle during rhinoplasty in patients with an active muscle and short upper lip; and to correlate our findings with our clinical experience to develop the applied algorithms.

**Methods:** This study was conducted by dissecting 82 depressor septi nasi muscles in 41 Iranian cadavers. Origin and insertion points of each muscle were studied.

**Results:** Three variations were found in muscle insertion points: periosteal, orbicularis oris, and floating. Forty-four percent of the muscles were inserted into the peri-

osteum of the maxilla (n=36); 39% of muscles were inserted into the orbicularis oris muscle (n=32); and 17% were diminutive or floating (n=14). Periosteal insertion was thicker and stronger than the other variations. In all cadavers, the origin of the muscle was medial crus of alar cartilage and caudal of the nasal septum.

**Conclusions:** This cadaveric dissection showed that the percentage of depressor septi muscle insertions is not similar to that found in other surveys. In this study, periosteal insertion of the depressor septi muscle was the most common variation.

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**T**HE DEPRESSOR SEPTI IS A small, paired muscle on either side of the nasal septum, originating from the medial crural footplate.<sup>1-3</sup> It is described in the literature as a nasal depressor muscle or digastricus nasi-septi labialis muscle because of the dynamic factor of the muscle in facial expressions, especially when one smiles. The muscles are located in the columella.<sup>4</sup>

When a person smiles, the functional unit is activated by a combination of 2 forces acting simultaneously in opposite directions that rotate the tip caudally and elevate the nasal base. The levator moves the alar base upward, and the depressor pulls the tip caudally.<sup>5</sup> Modification of the depressor septi and orbicularis muscles should be considered as a part of aesthetic rhinoplasty because these structures are important to the dynamics of the nose, contributing to the shortening of the upper lip and the nasal tip when the individual is talking and smiling.<sup>6</sup>

An active depressor septi muscle can accentuate a drooping nasal tip and shorten the upper lip on animation. Although the anatomy of the depressor septi muscle has been described, our goal of this cadaveric

study was to define variations of the depressor septi muscle in Iranians; to provide guidance for modification of this muscle during rhinoplasty in patients with an active muscle and a short upper lip; and also to correlate our findings with our clinical experience to develop the applied algorithms.

The depressor septi must be examined before rhinoplasty. In some patients, animation (particularly smiling) produces a deformity, characterized by a descending nasal tip, a shortened upper lip, and a transverse crease in the midphiltral area. These patients have an active depressor septi muscle and are a candidate for transoral depressor transposition during rhinoplasty to improve the tip-lip relationships and enhance the aesthetic result in rhinoplasty. The action of this muscle creates or accentuates this deformity. Several authors have addressed this problem by resecting the depressor septi muscle.<sup>1-3,7</sup>

## METHODS

The local research ethics committee approved this observational study, and relatives

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**Table. Variations of Depressor Septi Nasi Muscle Insertion in Iranian Cadavers**

Muscle Insertion	Muscles, No. (%)
Orbicularis oris	32 (39)
Periosteal	36 (44)
Floating (diminutive)	14 (17)
<b>Total</b>	<b>82 (100)</b>

of the deceased provided informed consent. This prospective, cross-sectional study was conducted by dissecting 82 depressor septi muscles in 41 cadavers. The study was performed in the Legal Medicine Organization in Tehran, Iran.

The mean age of the cadavers at the time of death was 42 years; 61% were men (n=25) and 39% were women (n=16). We studied anatomic variations of the depressor septi muscles by dissection of Iranian cadavers within 48 hours of time of death.

Our operative technique for modification of depressor septi includes 2 incisions: a transverse incision in the frenulum and buccal sulcus of the upper lip for intraoral exposure of the depressor muscle and a skin incision in the collumelar base toward the medial crural footplate and nasal septum for evaluation of muscle origin. The anatomic variations of the muscle were evaluated as orbicularis oris insertion, periosteal insertion, and floating (diminutive). After determination of insertion by collumelar base incision, origin of this muscle was evaluated by dissection around the medial crura of the alar cartilage and nasal septum. Findings in dissection of the depressor septi muscle, including origin, insertion, and variations were recorded.

All variables were analyzed with SPSS statistical software, version 16 (IBM) (*t* test and  $\chi^2$  test). Results were considered statistically significant at  $P < .05$ .

## RESULTS

To our knowledge, this is the first time such a study was performed on Iranian cadavers. We found no variation in the origin of the muscle in the medial crural footplate and caudal septum in both sexes ( $P < .05$ ). Also, right and left muscles were similar in origin and insertion in each cadaver.

We found a predominance of periosteal insertions in Iranian cadavers (44%; n=18 [36 muscles]). In 39% of cadavers, this muscle was inserted into the orbicularis oris muscle (n=16 [32 muscles]), and 17% had the diminutive or floating form (n=7 [14 muscles]) (**Table**). In the diminutive form, there was fibrous tissue instead of muscle fiber. There was no statistically difference between the sexes ( $P < .05$ ). Also, during cadaveric dissection, we found that the periosteal insertion was larger and stronger than the orbicularis insertion floating variation.

## COMMENT

An active depressor septi nasi muscle can accentuate the nasal tip and shorten the upper lip on animation.<sup>8</sup> Rohrich et al<sup>8</sup> found that dissection and transposition of this muscle can improve the nasal tip–upper lip relationship. In 1976, Wright<sup>9</sup> noted that an overactive septi muscle contributes to drooping of the nasal tip and that this phenomenon could be diagnosed by the smile test.

Ham et al<sup>10</sup> reported that the depressor muscle was responsible for tension at the nasal tip. Mahe and Camblin<sup>11</sup> have noted that transection of the depressor muscle may fail to produce lasting results because of reattachment of the muscle. Cachay-Velásquez<sup>2</sup> emphasized the importance of facial animation in revealing aesthetic imperfections that may otherwise go unnoticed when the face is in repose. The muscles of the nose participate in facial movement in harmony with the other muscles of the face; this is particularly true of the lip muscles, with the point of convergence being the nasal spine.<sup>12</sup> The depressor septi nasi is said to be underdeveloped in Japanese people compared with whites. Consequently, little consideration is given to this muscle in augmentation rhinoplasty in Japanese patients, although Furukawa,<sup>13</sup> Rohrich et al,<sup>8</sup> and others have emphasized importance of the depressor septi nasi in rhinoplasty.

An extremely rare case of hypertrophy of the depressor septi nasi muscle was described by Ohtsuka.<sup>14</sup> In another study,<sup>8</sup> 55 fresh cadavers were dissected, and the anatomic variations of the depressor septi muscle were recorded: type I inserted fully into the orbicularis oris (62%); type II inserted into the periosteum and incompletely into the orbicularis oris (22%); and type III was a rudimentary depressor septi muscle (16%).<sup>8</sup> In the present study on Iranian cadavers, 44% of muscles were inserted into the periosteum. These findings are not the same as the study by Rohrich et al.<sup>8</sup> In that survey, 62% of muscles were inserted into the orbicularis oris muscle. Transoral depressor septi muscle transposition enhances the tip–lip relationship, provides relative upper lip lengthening, gives fullness to the upper lip, and maintains tip rotation and projection on animation.<sup>8</sup>

In a study by Gamboa et al,<sup>4</sup> the depressor septi muscle was present in all cadavers. The anatomic origins and insertions were clearly identified as 2 longitudinal muscle bundles located at the columella and labial level, with origin at the nasal tip at the junction of the nasal dome and medial crura. The most caudal part of the muscle was inserted into the orbicularis oris muscle, which interdigitated at the mid section of the upper lip, and also was inserted at the level of the nasal spine.<sup>4</sup> In patients with dynamic drooping of the nasal tip and shortening of the upper lip, transpositioning of this muscle should be performed to achieve optimal aesthetic outcome in rhinoplasty.

## CONCLUSIONS

The present cadaveric dissection study showed that the percentage of depressor septi muscle insertion was not similar to that found in other surveys. At least 1 other study also found differences between Persian and Western anatomy.<sup>15</sup> Because more periosteal insertions apparently occur in Iranians, we need more transposition of this muscle during rhinoplasty to improve the nasal tip–upper lip relationship. Also, depressor muscles that inserted to the periosteum were larger and stronger than orbicularis insertions or floating variations. Based on these differences and some other unknown anatomic diver-

sity, it seems that some of the defined cosmetic frames may need minor revisions to be applicable to Persian faces. More studies in this field are recommended.

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