

Cervico-Mental Angle Suspensory Ligament: The Keystone to Understand the Cervico-Mental Angle and the Ageing Process of the Neck



Daniel Labbé¹ · Cynthia Souza Martins Rocha² · Franklin de Souza Rocha²

Received: 9 January 2017 / Accepted: 16 March 2017 / Published online: 4 April 2017
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Abstract The authors performed cadaveric dissections to investigate the existence of an anatomical structure creating and maintaining the cervical mental angle, aiming to understand the anatomical bases of the cervico-mental angle and its modifications over time. Six fresh cadaver dissections were performed; four were done in the Caen University anatomy laboratory one in Paris XV University and one in the Coventry University hospital, England. At the end of this investigation, the authors were able to demonstrate the existence of an anatomical structure in the neck, the cervico-mental angle suspensory ligament. This ligament that fixates the platysma and skin to deeper structures originated from the second branchial arch and seems to play a key role in the formation of the cervico-mental angle and in the anatomical alterations in the ageing process.

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Hyoid bone · Hyo-platysmal ligament · Necklift · Platysma

Electronic supplementary material The online version of this article (doi:[10.1007/s00266-017-0861-8](https://doi.org/10.1007/s00266-017-0861-8)) contains supplementary material, which is available to authorized users.

✉ Daniel Labbé
dr.labbe@wanadoo.fr

¹ Plastic Surgery Office, 4 Place Fontette, 14000 Caen, France

² Plastic Surgery Office, 1560 Tv. Dom Romualdo de Seixas, Belém, Brazil

Introduction

Facial rejuvenation surgery has been extensively discussed in the current literature. Different techniques, which aim to achieve the best and most natural aesthetic result, are described for the treatment of various facial regions. In this context, cervical rejuvenation surgery stands out, especially because of the complex anatomy of the neck. Therefore, obtaining the best aesthetic result depends directly on the accuracy of the clinical diagnosis, as well as on the proper identification of altered or misplaced structures.

Judicious analysis of the digastric corset surgical technique and lateral platysma suspension proposed by Labbé [1] allowed for the observation that the platysma muscle behaves as a digastric muscle, as proposed by Le Louarn [2]. As shown, the platysma muscle lowers the skin above the first neck crease towards the hyoid bone (and/or concentrate the skin between the mandibular border and the crease) and elevates the skin below the crease (Fig. 1). The authors then decided to perform cadaveric dissections to investigate the existence of an anatomical structure creating and maintaining the cervico-mental angle, invariably related to the first neck skin crease.

Previous articles described the existence of the hyo-platysmal ligament and its characteristics of conforming the cervico-mental angle [3], which, in our opinion, is not enough to explain its position or the form of the cervico-mandibular angle.

Objectives

To understand the anatomical bases of the cervico-mental angle and its modifications over the time.

Fig. 1 **a** Patient at rest, highlighting the first neck crease at the level of the hyoid bone. **b** Patient contracting the platysma, showing elevation of the skin *below* the first neck crease and lowering the skin *above*

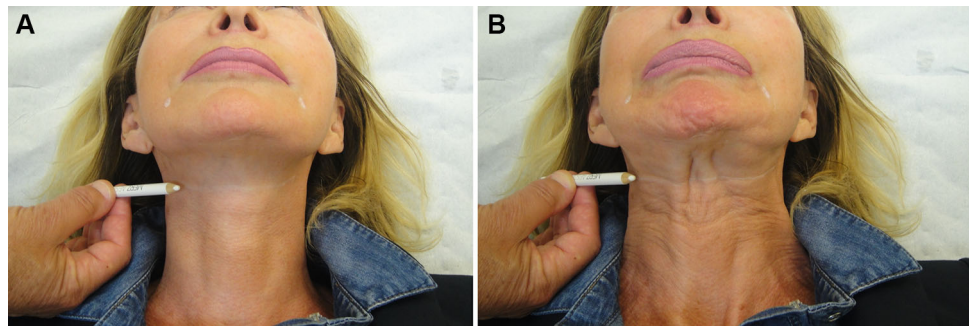


Fig. 2 Cervico-mental suspensory ligament of the neck attached to the undersurface of the platysma

Materials and Methods

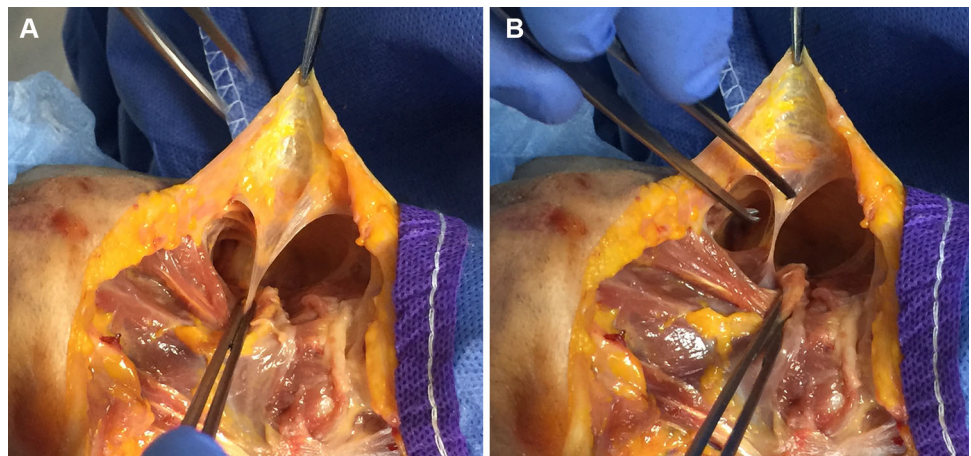
Six fresh cadaver dissections were performed; four were done in the Caen University Anatomy Laboratory (two males and two females), one in Paris XV University and one in the Coventry University Hospital. Cadaver ages ranged from 49 to 72 years; mean age was 61.6 years. Dissections were done from April 2015 to April 2016. The

skin landmarks were highlighted, and an approach from the surface to deep structures was used, with all deep structures meticulously dissected and photographically registered.

Results

In all six cadavers (12 sides), one structure was consistently found, a retaining ligament originating from the deep structures of the neck to the platysma and skin (Fig. 2). The fibrous structure previously described by Brandt [3] as the hyo-platysmal ligament originates from the body of the hyoid bone and inserts into the platysma muscle on its under surface and its overlying dermis. The authors continued the dissection from the medial to the lateral aspect of the neck and were able to identify the continuity of the cervico-mental angle suspensory ligament to both sides, as originating from the hyoid bone, lesser horn, and inserting in the styloid process. Essentially, the ligament extends from the styloid process of the temporal bone to the lesser horn (cornu) and the hyoid bone, following the exact trajectory of the second branchial arch in the embryological development [4].

Fig. 3 **a, b** Cervico-mental suspensory ligament dissected and retaining ligaments in the undersurface of the platysma



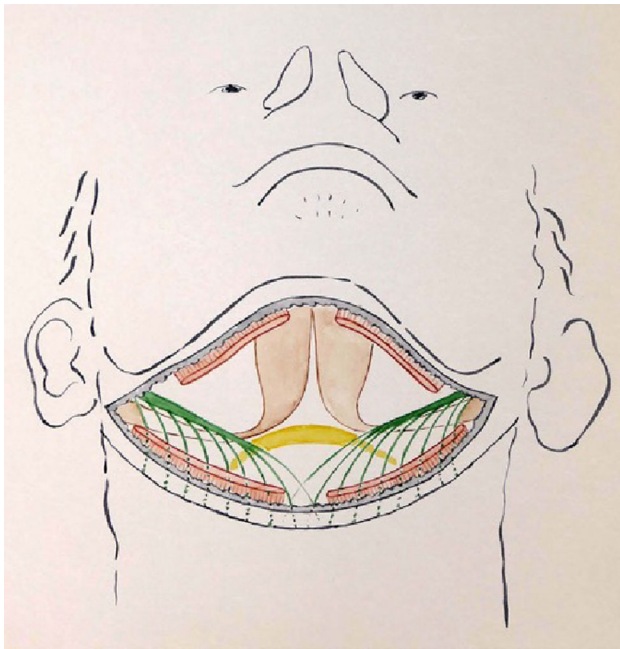


Fig. 4 Diagram showing the cervico-mental angle suspensory ligament (*green*), inserting on the undersurface of the platysma muscle and the overlying skin as retaining ligaments (Drawing by J. Bardot)

The ligament was found consistently on the 12 dissections performed (six cadavers/two sides) and highlighted, along with the platysma muscle, by undermining it from its superior and inferior attachments.

This cervico-mental suspensory ligament is thick on its central portion and thinner on its extremities. It allowed limited excursion when traction forces were applied laterally; however, when the forces were applied cephalic or

caudal to this structure, the range of the excursion was considerably higher, allowing for the repositioning of this ligament towards a triangular location located between the mastoid process and the mandibular angle. All along its trajectory, the ligament inserts on the undersurface of the platysma muscle and the overlying skin as retaining ligaments (Figs. 3, 4), suggesting that it is responsible for, and constitutive of the first neck crease.

In four dissections, the platysma muscle was sectioned above and below of the ligament, and the range of excursion was demonstrated (see Video) especially towards applying antero-posterior traction in the axis of the second branchial arc (hyoid arch, Fig. 5).

The point of traction used by the senior author is the lateral border of the platysma, which is located approximately 3 cm below the mandibular rim, in the angle between this rim and the anterior border of the sternocleidomastoid muscle [5] (Fig. 6).

Discussion

Furnas [6] previously described the auriculo-platysmal ligament, which merges and/or converges into the parotidomasseteric fascia and Loré's fascia. These ligaments suspend the platysma muscle in a posterior and cephalic position. Over time, the distention of these ligaments allows the descent of the platysma to a more antero-inferior position.

Brandt [3] reported briefly on the existence of a hyo-platysmal ligament originating from the lesser horn of the hyoid bone and participating in the pulley of the intermediate tendon of the digastric muscles, which sends its attachments to the platysma muscle and overlying skin.

Fig. 5 **a** Forceps indicating the level of the cervico-mental suspensory ligament (CMAS.L). **b** Applying antero-posterior traction repositioning the floor of the mouth

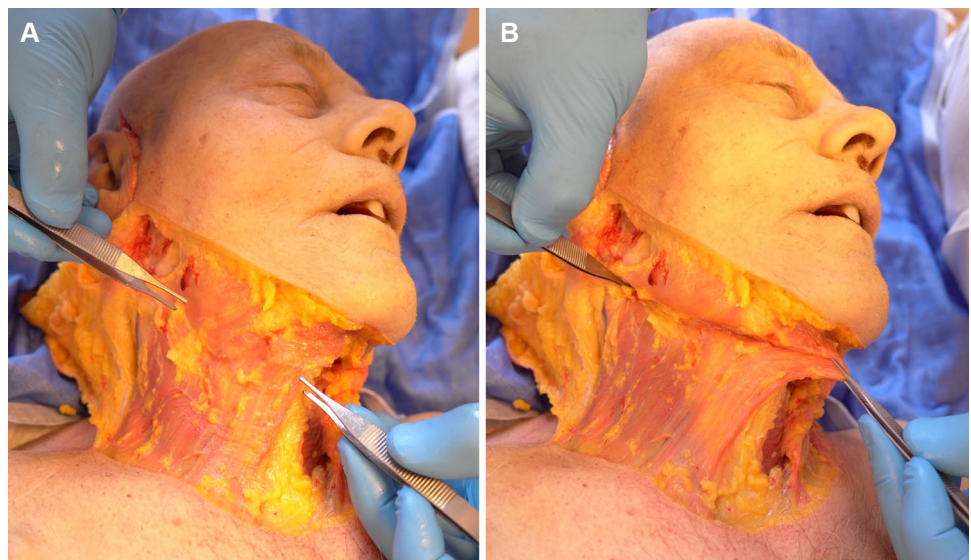


Fig. 6 **a** Diagram indicating the level of the cervico-mental angle suspensory ligament (green) and point of traction (red dot) in the platysma (red dotted line) **b** repositioning of the CMAS Ligament by means of lateral platysma suspension (Drawing by J. Bardot)

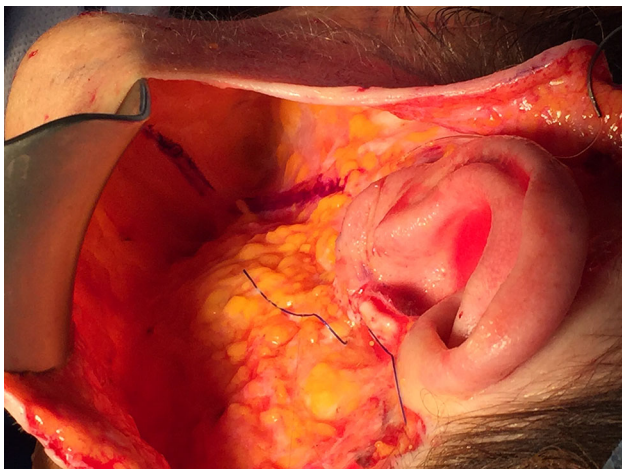
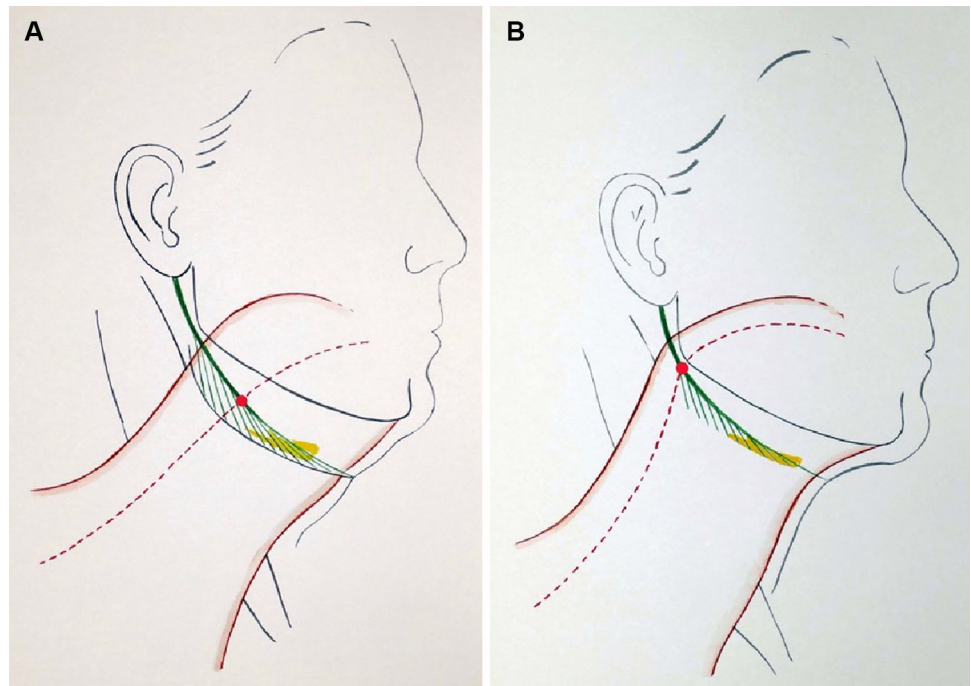


Fig. 7 Intra-operative view. Highlighted, the cutaneous attachments of the cervico-mental angle suspensory ligament. Key point for placing the sutures in the lateral platysma suspension

The first dissections allowed us to individualize a ligament arising from the hyo-platysmal ligament and extending laterally until the styloid process of the temporal bone. This structure causes expansions to the platysma and dermis, fixating both to the deeper plane (e.g. lesser cornu of hyoid bone and stylo-hyoid ligament). The position of the ligament always corresponds to the first cutaneous neck crease (Fig. 7).

This anatomical formation bridges the skin and the platysma muscle to structures originated from the second branchial arch (e.g. stylo-hyoid ligament, lesser cornu of

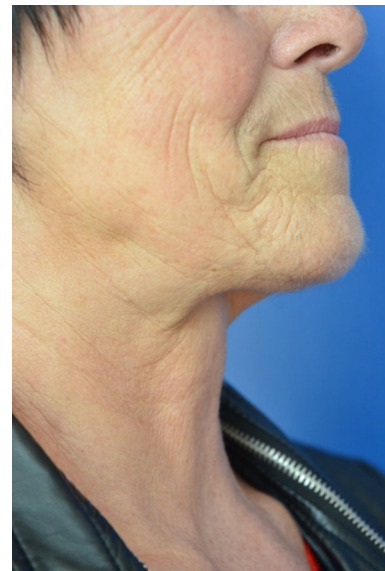


Fig. 8 First neck crease and its relations in aged neck

the hyoid bone) and seems to be a key element in understanding the complicated anatomical design of the platysma/skin complex and its alterations in the ageing process.

The authors believe that the reconstruction of the cervico-mental angle suspensory ligament (CMAS.L) and its lateral repositioning help to restore the neck contour and simplify neck lift procedures.

Conclusions

The authors were able to demonstrate the existence of an anatomical structure in the neck, the cervico-mental angle suspensory ligament that fixates the platysma and skin to deeper structures, which originated from the second branchial arch, and seems to play a key role in the formation of the cervico-mental angle and the anatomical alterations in the ageing process (Fig. 8).

This study allows for better comprehension of the process of neck ageing, which will lead to a more accurate diagnosis as well as further clinical and surgical applications that will be the object of further publications.

Compliance with Ethical Standards

Conflict of interest The authors declare that they do not have any financial or personal conflict of interest.

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