

# Extended cervicoplasty for correction of cervical changes

## *Cervicoplastia ampliada para correção de alterações cervicais*

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### ABSTRACT

**Introduction:** Cervicoplasty is considered an important part of facial rejuvenation. Despite the various techniques already described, the search for the ideal treatment is ongoing. The technical difficulties increase in complex cases, in which excessive skin sagging and pronounced muscular ptosis affect the maintenance of long-term results. **Objectives:** The aim of this study was to assess the suitability of the authors' protocol for extended cervicoplasty and to discuss the technical options available for this procedure. **Methods:** Eighteen patients underwent "round lifting" associated with platysma flap elevation at the midcervical line and partial subplatysmal fat removal. The patients were followed for 12 months and the late postoperative outcomes were assessed by 5 surgeons of the Brazilian Society of Plastic Surgery. **Results:** Four patients were excluded because they were lost to follow-up. Of the 14 assessed patients, 7 (50%), 5 (35.7%), and 2 (14.3%) patients had excellent, moderate, and poor outcomes, respectively. No patient had a perfect or bad outcome. **Conclusion:** Extended cervicoplasty yielded satisfactory results even in difficult cases. The proposed technique is a valid alternative for the plastic surgeon, because it ensures a pleasant and natural outcome that is maintained over time.

**Keywords:** Rhytidoplasty. Cervicoplasty. Neck muscles/surgery.

### RESUMO

**Introdução:** A cervicoplastia é considerada parte importante na cirurgia do rejuvenescimento facial. Apesar das diversas técnicas já descritas, a busca pelo tratamento ideal ainda persiste. As dificuldades aumentam nos casos considerados complexos, em que a flacidez excessiva de pele e a ptose muscular pronunciada prejudicam a manutenção dos resultados a longo prazo. **Objetivos:** No intuito de discutir as opções técnicas disponíveis para a cervicoplastia e apresentar a rotina cirúrgica utilizada pelo autor – com ênfase no tratamento ampliado sobre o músculo platísmo – é que este estudo foi delineado. **Método:** Dezoito pacientes foram submetidos ao *round lifting* associado à confecção de retalhos musculares de platísmo, na linha médio-cervical, e à retirada parcial da gordura subplatísmal. Os pacientes foram acompanhados por 12 meses e o resultado pós-operatório tardio foi avaliado por cinco cirurgiões plásticos da SBPCP. **Resultados:** Quatro pacientes foram excluídos do estudo por não retornarem para o acompanhamento pós-operatório tardio. Dos 14 pacientes avaliados, 7 (50%) tiveram o resultado classificado como excelente, 5 (35,7%) como moderado e 2 (14,3%) como fraco. Nenhum paciente teve o resultado classificado como perfeito ou ruim. **Conclusão:** A cervicoplastia ampliada proporcionou a obtenção de resultados satisfatórios, mesmo em casos difíceis. Acreditamos que a técnica é uma alternativa válida para o cirurgião plástico, podendo contribuir para que obtenhamos um resultado pós-operatório agradável, natural e mantido com o tempo.

**Descritores:** Ritidoplastia. Cervicoplastia. Músculos do pescoço/cirurgia.

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## INTRODUCTION

Since its origin, cervicoplasty has been considered an important part of facial rejuvenation, and its success remains defined by the ability to achieve a harmonious and natural neck<sup>1,2</sup>. Despite the various techniques already described, the search for the ideal treatment is ongoing, especially in complex or difficult cases, in which excessive skin sagging and pronounced muscular ptosis affect the maintenance of long-term results. Even today, “hard neck” treatment – a term made famous by McKinney<sup>3</sup> (Table 1) – is considered a challenge for the plastic surgeon<sup>4-10</sup>.

Modern cervicoplasty is compilation of the fundamental techniques proposed by several authors. For example, Millard et al.<sup>11</sup>, in 1968, systematized the access to the neck through the chin crease; Baker et al.<sup>12</sup>, in 1973, demonstrated the importance of approximating the medial edges of the platysma muscles and securing their lateral margins to the sternocleidomastoid muscles; and Feldeman<sup>13</sup>, in 1990, advocated the need for vigorous plication of the platysma at the midline. Later, authors such as McKinney<sup>3</sup>, Patrocínio and Patricínio<sup>6</sup>, and Pontes and Pontes<sup>14</sup>, among others, advocated the need for a more aggressive approach to cervicoplasty in complex cases, including subplatysmal fat resection and muscular flap elevation at the cervical midline<sup>8,15-17</sup>.

The aim of this study was to assess the suitability of the authors' protocol for extended cervicoplasty.

## METHODS

All patients scheduled for cervicoplasty at the private clinics of the lead author between January 2007 and June 2009 were enrolled in this prospective study. The classic technique of “round lifting”, recommended by Pitanguy<sup>18</sup>, was used in all cases along with platysma flap elevation at the cervical midline and partial subplatysmal fat removal. The surgical technique is summarized below.

**Table 1** – McKinney classification<sup>3</sup>.

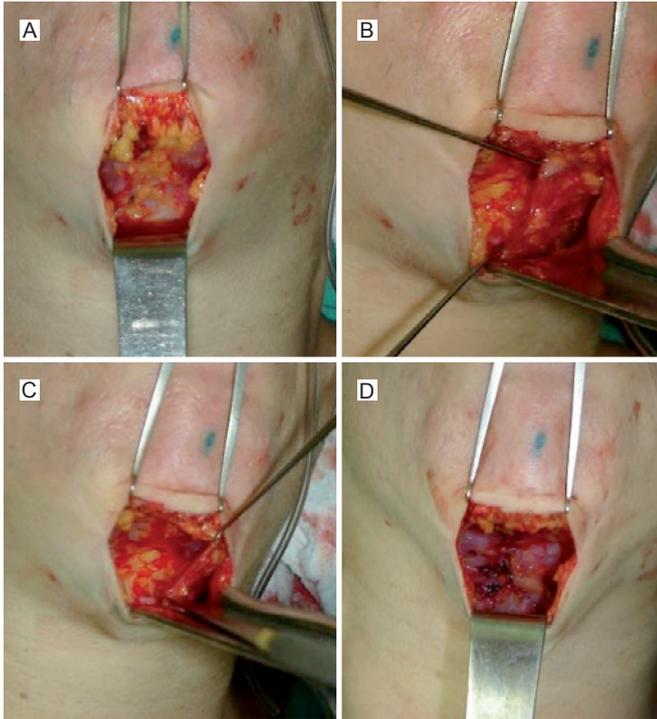
Degree	Cervical region
I	Just visible platysmal bands
II	Moderately visible platysmal bands
III	Very visible platysmal bands
IV	Very visible platysmal bands and excessive skin sagging

## Surgical Technique

The procedure was performed under light sedation, administered by an anesthesiologist, with fentanyl (0.05 mg/ml IV) and midazolam (5 mg/ml IV). The patient was positioned in the prone position with the head flexed, and antisepsis was ensured with 2% chlorhexidine solution followed by placement of sterile drapes. The surgeon stood behind the patient's head and, with methylene blue, marked the chin crease, ranging from 4 cm to 6 cm. Then, the cervical region was anesthetized by infiltration of about 100 ml of a solution containing 0.125% lidocaine and 1:200,000 epinephrine. An 11 blade was used to create a small incision for mild or moderate liposuction of the midcervical region, depending on the case characteristics. Then, a 15 blade was used to incise the marked chin crease, and the region was widely dissected with Metzenbaum scissors. The dissection involved the jaw line, anterior edge of the sternocleidomastoid muscles, and cricoid cartilage, showing the anatomical limits of the platysma. Then, the middle portion of each platysma muscle was resected, when these were in excess. The remaining medial edge of each platysma muscle was laterally dissected by about 2.5 cm to release it from the underlying musculature, and 2 muscular flaps were elevated. The subplatysmal fat was partially removed with Metzenbaum scissors. Then, the medial edges of the platysma flaps were approximated at the midline and sutured in a single layer (about 5-8 cm long) with simple 3-0 monofilament nylon sutures from the chin incision to the region of the hyoid bone (Figure 1). Finally, the classical sequence “round lifting”<sup>18</sup> was performed for plication of the SMAS-platysma system, at the malar, parotid, and infra-auricular regions (including the lateral border of the sternocleidomastoid; Figure 2) to improve the outcome.

After completion of the indicated ancillary procedures in each case, a suction drain, skin sutures, and a pressure dressing were placed. After the first 24 h postoperatively, the drain was removed and the dressing was replaced with a specific cervical compression mesh. The patient was discharged and monitored as an outpatient. The sutures were removed on the seventh postoperative day. The patient was recommended absolute bed rest for 7 days, and lymphatic drainage was carried out by a physiotherapist from the third postoperative day. Thereafter, the patient was monitored weekly in the first month and every 2 months until the seventh month. Twelve months after the procedure, the last examination was performed. Patients who did not return for all the follow-ups were excluded from the analysis.

In an illustrative and didactic manner, Figure 3 shows images of anatomical dissections performed on formalin-fixed specimens to demonstrate the platysmal detachment plane, subplatysmal fat removal, and muscular flap production at the midline.



**Figure 1** – Intraoperative period of patient K. **A:** Wide cervical dislocation and view of the medial edges of the bilateral platysma muscles; **B:** Medial border detachment of the left platysma and view of the subplatysmal fat; **C:** Left platysma flap elevation and partial removal of the subplatysmal fat; **D:** Advancement of 2 muscular flaps and suturing at the midcervical line.

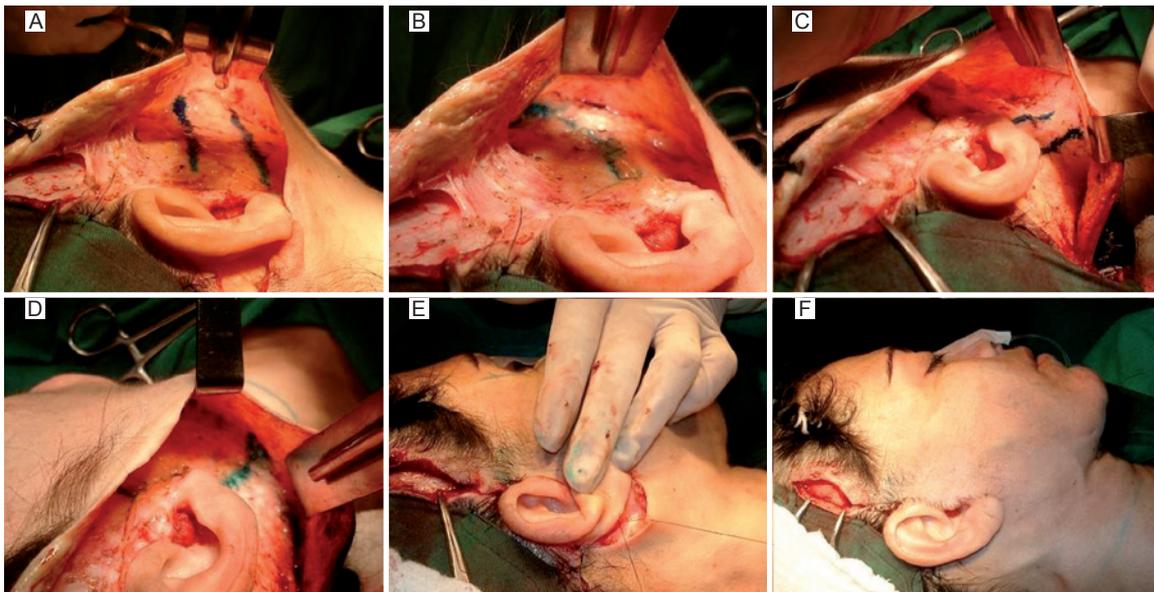
### Assessment of Outcomes

The surgical outcomes were assessed by 5 surgeons of the Brazilian Society of Plastic Surgery (JI Jr, MC, EL, GAPV, and GPV) using the preoperative and late postoperative (12 months) photographs. The assessments, based on the modified method of Antell and Orsek<sup>10</sup>, were scored as follows: 1 point = no improvement or poor outcome; 2 points = mild improvement; 3 points = moderate improvement; 4 points = substantial improvement; and 5 points = perfect outcome. The scores for each patient were summed and the result was deemed bad (5-8 points), poor (9-13 points), moderate (14-18 points), excellent (19-23 points), or perfect (24-25 points).

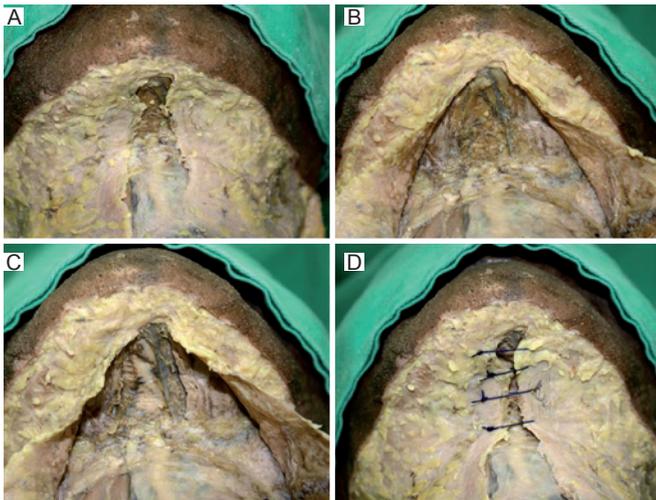
### RESULTS

Of the 18 patients who underwent extended cervicoplasty, 4 were excluded because they did not return for the follow-up visits. The patient characteristics are summarized in Table 1.

The mean (standard deviation) surgical time was 225 (47) min. No difficulty was encountered during platysma flap elevation and subplatysmal fat removal. All the patients were discharged about 24 h after the procedure. Their recovery was satisfactory, without complications, and only 1 patient (patient D, smoker, and McKinney class IV) developed hematoma and bilateral superficial necrosis in the infra-auricular region, resulting in a hypochromic scar.



**Figure 2** – Transoperative period of patient K. **A:** Marking the area of plication in the right malar-parotid region; **B:** Plication outcome; **C:** Marking the area of plication in the right infra-auricular region; **D:** Plication outcome; **E:** Placement of deep sutures for cervical flap support in the right auricular shell; **F:** Final aspect of cervicoplasty.



**Figure 3** – Cadaveric neck dissection. **A:** Skin and subcutaneous tissue removal, exposing the bilateral platysma muscles; **B:** Dissection and muscular elevation with subplatysmal fat exposure; **C:** Subplatysmal fat removal, while maintaining the vascular plexus, and exposure of the underlying musculature; **D:** Illustrative approach to platysma flaps without muscular sectioning.

Table 2 shows the assessment scores allotted by each plastic surgeon and the surgical outcomes. Figure 4 shows the comparison between the McKinney classification and the final scores of each patient. In the 12<sup>th</sup> postoperative month, 7 (50%) patients had an excellent outcome, 5 (35.7%) had a

**Table 2** – Patient characteristics.

Patient	Age (years)	Race	Gender	McKinney class <sup>3</sup>
A	59	W	F	IV
B	44	W	F	III
C	59	W	M	IV
D	51	W	F	IV
E	54	W	F	IV
F	52	W	F	IV
G	50	W	F	III
H	65	W	F	IV
I	48	W	F	III
J	55	W	F	IV
K	51	W	F	IV
L	49	W	F	III
M	58	W	M	IV
N	67	W	F	IV

Abbreviations: W (White), F (female) or M (Male).

moderate outcome, and 2 (14.3%) had a poor outcome. No patient had a perfect or bad outcome.

Figures 5 to 10 show the preoperative and 12-month postoperative photographs (frontal, left, and right views) of some patients.

## DISCUSSION

The literature seems to show a consensus regarding several aspects of the “hard neck” approach: the need for more effective technical options to deliver superior results has been described by several authors for years<sup>3,6,8,13,16,19,20</sup>.

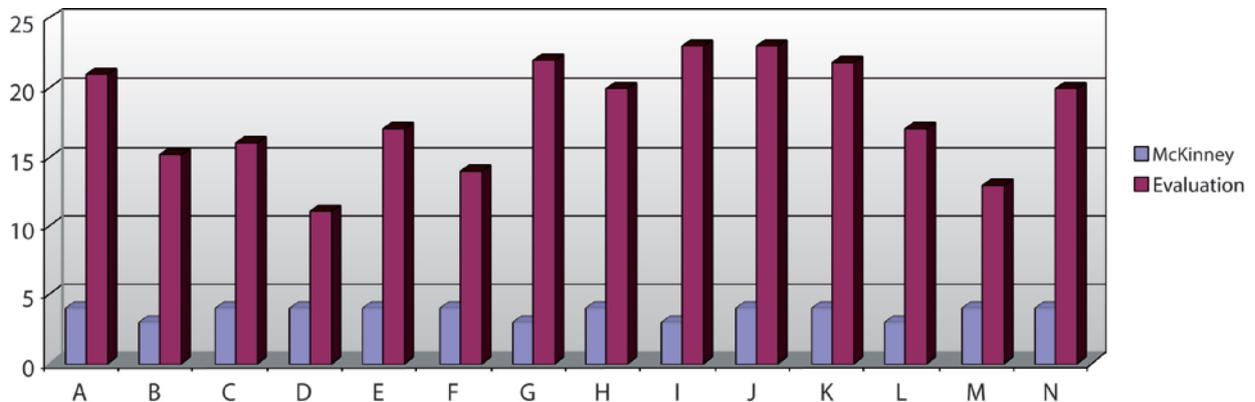
Extended cervicoplasty, a combination of several surgical procedures, is a much recommended alternative by plastic surgeons who aim at high-quality treatment of complex cases<sup>9,15</sup>. According to Cardoso de Castro et al.<sup>2,15</sup>, in these cases, minor procedures, frequently indicated by inexperienced surgeons, yield limited and ephemeral outcomes besides causing complications. To achieve excellent outcomes in difficult cases, the extended cervicoplasty procedure described herein was performed with several technical options: neck liposuction<sup>21</sup>, wide detachment of the cervical subcutaneous tissue, partial subplatysmal fat removal<sup>6</sup>, elevation and advancement of platysma flaps at the midline<sup>22</sup>, and plication of the SMAS-platysma complex at the malar region (cranial vector) and sternocleidomastoid region (side vector)<sup>15,18</sup>.

At present, superficial neck liposuction is performed by most surgeons. It ensures a smooth approach to the neck, reducing the occurrence of irregularities and facilitating posterior detachment with scissors<sup>2,8,16,17,21,23</sup>. Wide subcutaneous detachment, by means of a chin incision, is also considered important in difficult cases of cervicoplasty<sup>14,15,24</sup>. Pontes and Pontes<sup>14</sup>, Marchac et al.<sup>23</sup>, Cardoso de Castro<sup>25</sup>, and Gomes Filho et al.<sup>24</sup> advocated this procedure, facilitating access to the cervical structures and the subsequent accommodation of skin. Some authors, however, argue for smaller detachments<sup>16,21</sup>. Although limited dissections preserve the skin quality and minimize the risk of complications, when compared with extensive rhytidoplasty<sup>16,21</sup>, we are of the opinion that wider detachments enable better treatment of the neck, especially in complex cases, as described by Cardoso de Castro et al.<sup>15</sup>.

Among the techniques used in this study, subplatysmal fat removal is the least discussed in the literature. Pontes and Pontes<sup>14</sup> advocated this procedure, claiming that it enables superior outcomes. According to Patrocínio and Patrocínio<sup>6</sup>, the partial removal of subplatysmal fat enables greater advancement of the platysma toward the midline, reducing stress on the muscle and enhancing the outcome. Zins and Fardo<sup>16</sup>, Knize<sup>8</sup>, Gryskiewicz<sup>17</sup>, and Cardoso de Castro<sup>2</sup> advocated subplatysmal fat removal when it is excessive. Neves et al.<sup>26</sup>, however, disagreed, stating that subplatysmal

**Table 3** – Assessment scores and surgical outcomes.

Patient	JI Jr	MC	EL	GAPV	GPV	Sum	Outcome
A	5	4	5	4	4	21	Excellent
B	4	3	3	3	2	15	Moderate
C	4	3	4	2	3	16	Moderate
D	3	3	2	1	2	11	Poor
E	4	4	4	3	2	17	Moderate
F	3	4	4	2	1	14	Moderate
G	4	5	5	4	4	22	Excellent
H	4	4	4	4	4	20	Excellent
I	4	5	5	5	4	23	Excellent
J	5	4	4	5	5	23	Excellent
K	5	4	5	4	4	22	Excellent
L	4	4	5	2	2	17	Moderate
M	3	4	3	2	1	13	Poor
N	4	4	4	4	4	20	Excellent



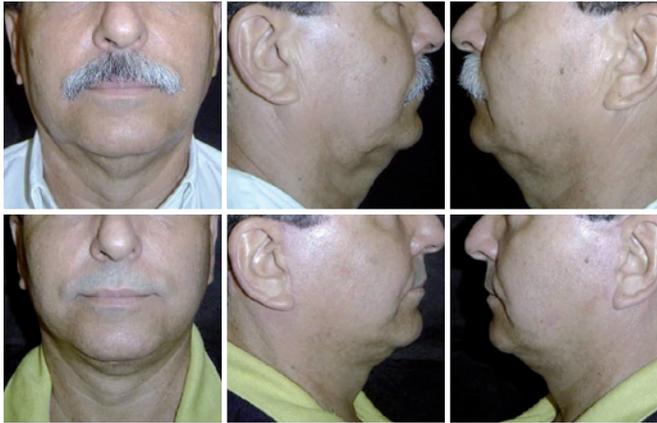
**Figure 4** – Relationship between the McKinney classification and the final scores of each patient.

fat removal has more risks than benefits. Cardoso de Castro<sup>2</sup> warned that excessive fat removal could cause inconvenient irregularities in the submental skin. According to Zins and Fardo<sup>16</sup>, great advocates of the technique, subplatysmal fat removal should not exceed the lower edge of the digastric muscle. From the present results, subplatysmal fat removal enables better approximation of the medial edges of platysma flaps, minimizing tension on the midline sutures, allowing long-lasting and natural outcomes, and reducing morbidity after cervicoplasty.

Platysma flap preparation, although described for years, is also undervalued in the literature today. In general, most authors have advocated only simple plication of the platysma at the midline<sup>8,16</sup>. This procedure repositions the elements supporting the neck but yields disappointing and ephemeral outcomes in



**Figure 5** – Preoperative and postoperative photographs of patient G.



**Figure 6** – Preoperative and postoperative photographs of patient M.



**Figure 9** – Preoperative and postoperative photographs of patient K.



**Figure 7** – Preoperative and postoperative photographs of patient H.



**Figure 10** – Preoperative and postoperative photographs of patient E.



**Figure 8** – Preoperative and postoperative photographs of patient J.

more complex cases, with pronounced sagging<sup>2,5,6,9,15</sup>. Since Connell's paper<sup>22</sup>, in 1978, several authors achieved excellent

results with platysma flaps at the midline of the neck. In 1979, Aston<sup>27</sup>, who advocated the importance of muscular flap elevation, developed a procedure that was later called "Aston's platysmoplasty". Zins and Fardo<sup>16</sup> obtained excellent results with this technique. The anatomical dissections presented herein demonstrate the existence of a well-defined cleavage plane between the medial border of the platysma and the underlying musculature. Labbé et al.<sup>9</sup> already identified a similar plane at the lateral border of the platysma. During cervicoplasty in this study, platysma flap elevation was facilitated by extensive muscular dissection in the aforementioned cleavage plane; subplatysmal fat removal also facilitated the approximation of these flaps, avoiding the need for sectioning the platysma. Aston<sup>27</sup>, Zins and Fardo<sup>16</sup>, and Cardoso de Castro<sup>2</sup> proposed sectioning of the medial edges of the platysma below the hyoid bone. Aston<sup>27</sup> emphasized that, without such sectioning, muscular flap elevation would skeletonize the neck. Further, Neves et al.<sup>26</sup> stated that,

without this sectioning, the technique would become considerably more difficult. However, platysmal sectioning was not performed in this study, because the combination of techniques for extended cervicoplasty was considered adequate to achieve satisfactory results with lower morbidity, besides avoiding platysmal weakening<sup>8</sup>.

We, as do many authors, consider the treatment of the SMAS-platysma complex as an essential part of cervicoplasty in difficult cases, coupled with the previously described midcervical approach<sup>2,9,15,25</sup>. Horizontal plication of the SMAS in the malar region ensures that the midfacial rise vector is vertically directed, not only latero-superior. This rise corrects sagging in the middle region of the mandible<sup>15</sup>. Vertical infra-auricular plication, secured on the sternocleidomastoid, ensures lateral traction of the platysma, which is considered essential for achieving a harmonious neck profile<sup>9,23</sup>. The depth approach, only in the midline of the neck, causes inappropriate treatment of the jaw line and submandibular gland ptosis<sup>5,15</sup>.

Analysis of surgical outcomes is essential to determine the success or failure of a technique. Cardoso de Castro et al.<sup>15</sup> considered the assessment of a facial surgery outcome to be very difficult, subjective, and variable. Patrocínio and Patrocínio<sup>6</sup>, for example, measured only the degree of patient satisfaction in the postoperative period. Labbé et al.<sup>9</sup> credited little scientific value to patient self-assessment. Ellenbogen and Karling<sup>28</sup>, Flores et al.<sup>7</sup>, Labbé et al.<sup>9</sup>, and Gryskiewicz<sup>17</sup> used various assessment methodologies comparing different cerebrospinal profilometry angles, which hinders its applicability. For simpler and straightforward assessments that are comparable with other techniques, the methodology proposed by Antell and Orseck<sup>10</sup> was applied in this study. By assessing specific points preoperatively and postoperatively, a simple, efficient, fast, and reproducible method was developed.

The timing of postoperative assessment has also been discussed in the literature. Ellenbogen and Karling<sup>28</sup>, Antell and Orseck<sup>10</sup>, Gryskiewicz<sup>17</sup>, and Labbé et al.<sup>9</sup> argued that the minimum time to assess the outcomes of cervicoplasty properly is 12 months. On the other hand, Cardoso de Castro et al.<sup>29</sup> and Patrocínio and Patrocínio<sup>6</sup> stated that the outcomes can be assessed in 4-6 months. By using only the methodology of Antell and Orseck<sup>10</sup>, the outcomes were assessed 12 months after cervicoplasty in the present study.

Antell and Orseck<sup>10</sup> compared several techniques (more and less aggressive), applied on 8 pairs of monozygotic twins, and reported results similar to those presented here: 44% excellent results, 25% moderate results, and 31% poor results. Among other aspects, precise comparison with other studies and techniques was hampered by the use of different methodologies or analyses (absent in several publications<sup>5,6,9,28</sup>).

Chia<sup>30</sup>, in 2008, discussed the principles for midfacial treatment, and we believe that they can also be applied to

lower-third facial surgery. Especially, for successful facial rejuvenation surgery, it is necessary to combine the following principles: wide detachment of the tissue to be lifted, direct approach to the structure being treated, attenuation of opposing muscular forces, and repositioning and securing to steady or rigid structures<sup>30</sup>. These principles were followed for extended cervicoplasty in this study to obtain long-lasting outcomes.

## CONCLUSION

Especially in patients with excessive local sagging, the outcome of cervicoplasty is closely related to the combination of techniques used during the procedure, including platysma flap elevation and partial removal of subplatysmal fat. The cervicoplasty technique described herein is a valid alternative for the plastic surgeon, because it ensures a pleasant and natural outcome that is maintained over time.

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