

Is lip repositioning operation actually effective in treatment of gummy smile?

Dudağın yeniden konumlandırılması operasyonu dişeti gülümsemesi tedavisinde gerçekten etkili mi?

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Abstract

Background: Modified lip repositioning operation (MLR) are being used very frequently in recent times for treating Gummy Smile (GS) caused by hyperactive upper lip as they are easily applicable, have very few side effects and high patient satisfaction. The purpose of this study is to assess whether or not the effects of MLR operation that is used in GS treatment is temporary.

Methods: In this study, 16 female patients who had complaints of excessive visibility of their gums while smiling were treated by MLR operations. The amounts of visibility of the gums were measured before the operation and in the 3rd and 6th months following the operation.

Results: According to the measurements that were made and analysis that was carried out, the mean amounts of visible gums before the operation, 3 months after the operation and 6 months after the operation among the 16 patients were respectively 4.93 ± 0.85 mm, 1.06 ± 0.98 mm and 2.87 ± 0.8 mm. The mean amount of reduction in the amounts of the visible gums after the operation were respectively 3.75 ± 0.93 mm and 2.06 ± 0.68 mm for the 3rd and 6th months after the operation.

Conclusions: Based on the results of this study, we may state that the effects of the MLR operation on the amount of visible gums while smiling decrease in time. However, the fact that the study was carried out on a few patients prevents us from reaching precise conclusions about this topic. As the authors, we recommend that similar studies are carried out with larger samples, and for the purpose of restricting lip movements, Botulinum Toxin is applied 2 weeks before the operation.

Keywords: Gummy Smile, modified lip repositioning operation, excessive gingival display.

Öz.

Amaç: Modifiye dudağın yeniden konumlandırılması (MDYK) operasyonu kolay uygulanabilir olması, çok az yan etkisinin olması ve yüksek hasta memnuniyeti nedeniyle hiperaktif üst dudağın sebep olduğu Gummy Smile'in (GS) tedavisinde son zamanlarda çok sık kullanılmaktadır. Bu çalışmanın amacı GS tedavisinde kullanılan MDYK operasyonunun 6 aylık dönemde etkisinin geçip geçmediğini değerlendirmektir.

Materyal ve Metot: Bu çalışmada gülümseme esnasında dişetinin fazla görünmesinden şikayetçi olan 16 bayan hasta MDYK operasyonu ile tedavi edildi. Operasyon öncesi ve operasyondan 3-6 ay sonra gülümseme esnasında görünen dişeti miktarları ölçüldü.

Bulgular: Yapılan ölçüm ve analize göre operasyondan önce ve operasyondan sonraki 3-6. ayda 16 hastada gülme esnasında ortalama görünen dişeti miktarı sırasıyla 4.93 ± 0.85 mm, 1.06 ± 0.98 mm ve 2.87 ± 0.8 mm olarak hesaplandı. Operasyon sonrası dişetindeki ortalama azalma miktarı ise operasyondan sonraki 3. ve 6. ayda sırasıyla 3.75 ± 0.93 ve 2.06 ± 0.68 mm olarak tespit edildi.

Sonuç: Bu çalışmanın sonucuna dayanarak; MDYK operasyonunun gülme esnasında görünen dişeti miktarı üzerine etkisinin zamanla azaldığını söyleyebiliriz. Ancak araştırmanın az sayıda hasta üzerinde yapılmış olması, bu konu hakkında kesin sonuçlara varmamızı engellemektedir. Biz yazarlar olarak buna benzer çalışmaların hasta sayısının fazla olduğu gruplar üzerinde yapılmasını ve operasyonun daha etkili olması için, dudak hareketlerinin kısıtlanması amacıyla operasyondan 2 hafta önce üst dudağı yukarı kaldıran kaslara Botulinum Toksin uygulayarak yeni çalışmalar yapılmasını önermekteyiz.

Anahtar kelimeler: Dişeti gülümsemesi, modifiye dudağın yeniden konumlandırılması operasyonu, dişetinin aşırı derecede görünmesi

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Introduction

Among all facial expressions, smiling has the most pleasing appearance and is the most complicated. Lips, teeth and gums are 3 components that affect smiling (1). Although smiling has a key role in facial aesthetics, approximately 7% of men and 14% of women have complaints about excessive visibility of their gums while smiling (2). While it is considered normal when 1-2 mm of the gums between the lower border of the upper lip and the marginal border of the central teeth is visible while, if this visibility exceeds 4 mm, such a smile is considered to be an unattractive one (3). Gummy smile (GS) refers to the condition where the gums between the border of the upper lip and the margins of the central teeth are visible by more than 3-4 mm (3,4). There are several intraoral and extraoral etiologies that lead to the occurrence of GS (5). Vertical maxillary excess, hypermobile upper lip and short upper lip are considered as extraoral factors that lead to GS (6,7). An intraoral factor that leads to GS is passive eruption (7,8). As the treatment of GS varies based on its etiology, determining the etiology that caused it before treatment is important for the success of the operation. (9) Orthognathic surgery (10), botulinum toxin application on the muscles that regulate smiling (11), myotomy (12,13), gingivectomy (14) and lip repositioning (15–17) are methods that are used in GS treatment.

A study on patients with complaints of GS reported that hypermobile upper lip syndrome was the most dominant etiological factor that led to GS by itself in approximately 45.3% of the patients and alongside passive eruption in approximately 34% of patients (18). Lip repositioning (LR) operation, which aims to reduce the amount of gingival visibility by restricting the movements of the muscles that lift the lip in treatment of GS caused by hypermobile upper lip, was performed for the first time in 1973 by Rubinstein (19). After this date, various modifications have been made on this operation. One of such modification is the operation of MLR that is carried out on the frenulum without incision (20,21). Nowadays, it is a method that is frequently used by itself or in combination with other treatment methods for treating GS caused by hypermobile upper lip (22–24). This method is also used as an alternative to orthognathic surgery in the case of GS caused by vertical maxillary excess (15). It is believed that lip repositioning is a more applicable method in comparison to time-consuming and expensive surgical procedures that lead to various complications such as orthognathic surgery (22,25).

Treating GS by repositioning the lip provides highly satisfactory results for patients in the short-run (21,26,27). There are several studies in the literature on the extent to which the amounts of gingival visibility were reduced by lip repositioning operation (13,21,26,27). In such studies, it was reported that an average of 3-4 mm of reduction was achieved in gingival visibility by repositioning the lip (27).

On the other hand, many studies also reported that the amount of gingival visibility after lip repositioning operation increased in time, and there were cases of relapse (8,13,15,28).

The purpose of this study is to investigate how much reduction the MLR technique, which is considered to be a conservative method in treatment of gummy smile, achieves in the amount of gingival visibility and whether or not relapse occurs in the 3rd-6th months after operation.

Materials and Methods

Patient selection

This clinical study included a total of 16 female patients at the ages of 26 to 32 (mean: 29.64) who visited the Department of Periodontology at the Faculty of Dentistry at Harran University with complaints of excessive visibility in their gums while smiling.

Patients who had no contraindications in terms of periodontal surgery and no systemic disease that would affect wound healing were selected for the study. Attention was paid to include patients who did not smoke. Approval was obtained for the study from the Clinical Research Ethics Board at the Faculty of Dentistry at Dicle University. All patients provided informed consent forms before surgery.

Procedure

In order to determine the changes in the gingival visibility before the operation and in the 3rd-6th months after the operation, measurements were made for each patient on the amount of visible part of the gums between the lower border of the upper lip and the zenith point of the central teeth at a complete smiling position (periodontal probe), and photos were taken (Figure 1).



Figure 1. Amount of gingival visibility before surgery.

Operation technique

This technique was applied for the first time in 1973 by Rubinstein and Kostianovsky. The patient did not have any systemic disease or periodontal problem that would set an obstacle for the operation. The outside of the mouth and

the intraoral area were disinfected by a 2% betadine solution. Conventional local anesthesia (Jetokain vial-Lidokain HCl 20 mg/ml, Epinephrine HCl 0.0125 mg/ml-ADEKA, Turkey) was applied between the upper first premolars. After the tissues were dried with a sterile pen, markings were made. Half-thickness incision was made by using a number 15 scalpel tip (Beybi, Turkey) by taking the points marked from the mucogingival junction as reference. Parallel incision was made towards the labial mucosa in a way that it would be at about 10-12 mm of distance from the initial incision. The next two incisions were combined elliptically on the level of the first premolars. The epithelium tissue with a width of approximately 1 cm between the regions of incisions was removed without touching the frenulum so that connective tissue was left under it (Fig. 2-3). After bleeding was taken under control, suturation was made by a 4/0 silk suture (DOĞSAN, Turkey) (Fig. 4). The patient was recommended to apply ice compression to prevent edema after the operation and restrict lip movements while smiling and speaking for a week.

Statistical analysis

The statistical analysis of the obtained data was carried out with a statistical analysis software (IBM SPSS Statistics 21). Shapiro-Wilk test was used to test the normal distribution of the data, while Levene's test was used to test homogeneity. For the samples included in the study, One-way ANOVA test was used to compare the amounts of gingival visibility before operation and 3 months after the operation. The level of statistical significance was accepted as $p < 0.05$ for all tests.



Figure 2. Modified lip repositioning operation.

Results

Our study included a total of 16 female patients at the ages of 26-36 (mean: 29.35 ± 3.06). In the measurements on the photographs taken before the operation, the mean amount of gingival visibility during a complete smile was 4.93 ± 0.85 mm. In the measurements that were made 3 months and 6 months after the operation, these mean values were respectively 1.06 ± 0.98 and 2.87 ± 0.8 mm (Fig. 5). The mean

amounts of decrease in the gingival visibility after 3 months and after 6 months following the operation were respectively 3.75 ± 0.93 and 2.06 ± 0.68 mm (Fig. 6). A correlation analysis was carried out to investigate the effects of the amounts of gingival visibility on the amounts of reduction in gingival visibility after the operation. The analysis revealed that the preoperative amounts of gingival visibility did not significantly affect the amount of reduction after the operation ($p = 0.069$). In the statistical analysis that was carried out to compare the changes that took place in the gums in the 3-month and 6-month postoperative periods, a statistically significant difference was observed between the two periods ($p = 0.001$). Accordingly, it was determined that the mean increase in the amount of gingival visibility (relapse) between the 3- and 6-month period following the operation was 1.68 ± 0.60 mm (Fig. 7).



Fig. 3. Strips of soft tissue excised during MLR operation.

Discussion

This study was carried out to determine the extent to which lip repositioning operation that was used to treat GS caused by hypermobile upper lip provided reduction in the

amount of gingival visibility and the changes observed in the gums in a short period after the operation (3-6 months). In smiling aesthetics, lip curvature, symmetry of teeth and the amount of gingival visibility are highly important (29,30). Several studies reported that minimal visibility of gums during smiling is acceptable (31). LR method was used for the first time by Rubinstein and Kostianovsky for treating GS caused by hypermobile upper lip and vertical maxillary excess (22). The purpose of this operation is to reduce the retraction of the upper lip by restricting the muscles that elevate the lip and provide reduction in the amount of gingival visibility (19). Orthognathic surgery, which is one of the treatment methods used for GS, has a high rate of morbidity (22). Although LR operation is a safe method, it is possible to observe some minimal complications after the operation such as swelling, bruising in the lip region, feeling distress, difficulty in some movements of the upper lip, sense of numbness, and due to the presence of several minor salivary glands in the region, mucocele formation (8,21,32). While mucocele formation was not observed in any of our patients, some had complaints of sensation of tension on their lips. In the follow-up appointment 3 months after the operation, these patients reported that this sensation of tension went away.



Fig. 4. Suturing after MLR operation.

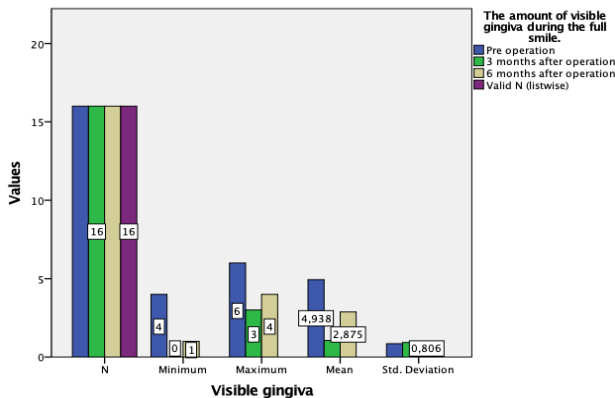


Fig. 5. Minimum, maximum and mean records of gingival visibility before and after surgery.

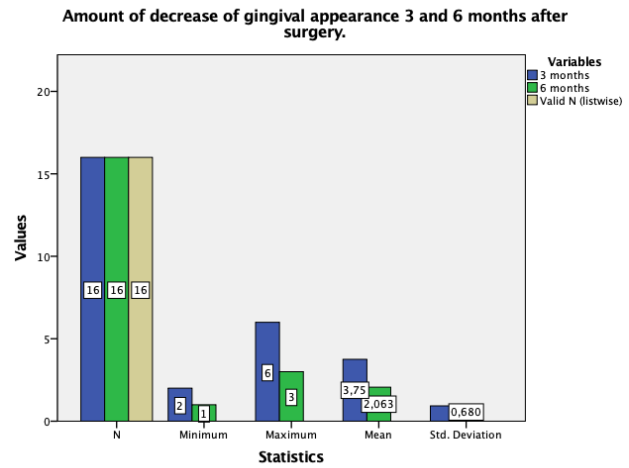


Fig. 6. Amounts of decrease in gingival visibility in 3 and 6 months after surgery.



Fig. 7. Amount of gingival visibility observed in the 6th month after operation.

Table 1: The amounts of gingival visibility in patients during a complete smile before the operation and 3-6 months after the operation. Minimum, maximum and mean records of gingival visibility before and after surgery.

| | N | Min | Max | Mean | Std. Deviation |
|--------------------------|----|-----|-----|------|----------------|
| Pre Operation | 16 | 4 | 6 | 4,93 | 0,85 |
| 3 months after operation | 16 | 0 | 3 | 1,06 | 0,92 |
| 6 months after operation | 16 | 1 | 4 | 2,87 | 0,8 |

In the literature, several studies have been conducted regarding the extent to which LR operations provide reduction in the amount of gums that are visible during smiling (15,26,33,34). Tawfik et al., in their systematic study that aimed to determine the amount of reduction in the amount of gingival visibility during smiling provided by LR operation, reported a mean reduction amount of 3.4 mm for a 6-month period (27). In another study, Silva et al. found that the mean amount of gingival visibility which was 5.8±2.1 mm before LR operation, was reduced by 4.4 mm after the operation. The same authors reported that there was no

change (relapse) in the amount of gingival visibility while smiling in the 3rd and 6th months after the operation (21). In our study, we determined that the mean amounts of gingival visibility during smiling before the operation, 3 months after the operation and 6 months after the operation were respectively 4.93 ± 0.85 mm, 1.06 ± 0.92 mm and 2.87 ± 0.8 mm. Additionally, in comparison to the preoperative period, the mean amounts of reduction in the 3rd and 6th months after the operation were calculated as 3.75 ± 0.93 and 2.06 ± 0.68 mm respectively.

In our literature review, we observed that there have been several studies which reported minor relapses after 6 months following MLR operations and that the effects of the operation went away in 12 months (8,15,15). Contraction of the connective tissue found under the mucosa is considered to be the reason for these relapses. For preventing these relapses, some researchers recommended patients to restrict their lip movements for 4 weeks and doctors to not remove the sutures found in the medial line and corners of the mouth for 4 weeks (22). In contrast, some studies reported that the effect of the operation successfully continued in the 6-month period after the operation (21). Considering the results that were obtained in our study, the mean amount of gingival visibility during smiling increased by 1.68 ± 0.60 mm between the 3rd and 6th months after the operation. The statistical analyses showed that this increase was statistically significant ($p=0.001$). In the light of these results, we report that the outcome of the operation might not be stable, and the effect of the operation may diminish over time.

Recently, LR operations are utilized highly frequently as they are easily applicable, have very few side effects and high patient satisfaction. There are disagreements in the literature regarding the effects of the operation. In our study, we observed that the effect of the operation was reduced in a short time as 6 months. This is why we reported that the effect of the LR operation in treatment of GS may diminish over time. However, the fact that the study was conducted on a small number of patients prevents us from reaching precise conclusions about the topic. As the authors of this study, we recommend that similar studies are conducted with larger samples, and new studies are conducted by applying botulinum toxin 2 weeks before the operation with the purpose of restricting lip movements.

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