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Posterior Auricular Muscle Pull-Back (PAMP) Technique for Prominent Ear Correction

*Bekir Atik**

Department of Plastic and Reconstructive Surgery, Istanbul Medeniyet University, Turkey

Abstract

Background: The prominent ear is an anatomical disorder characterized by a large angle between the auricle and the skull. One of the main causes of the problem is that the transverse auricular muscle cannot develop sufficiently. This muscle is in the area between antihelix and antitragus, called primary plica, and the transverse auricular muscle sticks here. The muscle reaches the concha and fixes the antihelix to the concha. In this study, the posterior auricular muscle was separated from its adherence to the concha and advanced to the primary plica point instead of the transverse muscle and the results were evaluated.

Material and Method: 12 girls and 8 boys were examined in the study. The efficacy and recurrence status of this operation was evaluated by measuring the distance between the auricle and the skull in 0 and 6 months before and after the operation in mm. The results were compared with the "Student's T-Test".

Result: If the p values obtained in the test results were <0.05, they were considered significant and no recurrence was observed in any case.

In addition to the classical techniques known with this technique, it was concluded that recurrence due to loosening of the sutures can be prevented by using the posterior auricular muscle flap.

Introduction

Prominent Ear is an anatomical disorder characterized by an extremely large angle between the auricle and the skull. It is seen in the pediatric population at a rate of 5% and is autosomal dominant [1]. Children who have prominent ear begin to experience social problems after school age [2]. The main problem here is both anatomical and clinical. Luckett published the first and important article on this subject in 1910 [3]. He suggested that prominent ear treatment should be done by considering the anatomical principles. In subsequent studies, it was revealed that the condition that caused the ear ante version is a burst in the concha and the absence of antihelix [4].

In all these studies, it was aimed to prevent the loss of antihelix and to decrease the angle between the ear and skull. However, partial or full opening in the ears after the operations is a serious problem. In the literature, this rate has been reported as 0 to 12% [5]. More than 200 techniques have been described in the English literature in the treatment of prominent ear [5-8]. The reason for so many techniques existing is that the desired aesthetic results are not fully achieved, and partial or complete recurrence is seen a few months after the operation.

In this study, it was aimed to investigate the effectiveness of advancement of the posterior auricular muscle to the Primary Plica (PP) point, which is defined as the region where the transverse auricular muscle is weak in the prominent ears.

Material and Method

Twelve female and (mean age of -+ (16.7 ± 5.28 years) 8 male patients (mean age of 20.25 ± 6.16 years) who have undergone bilateral prominent ear surgery were examined in this study with their permission. Those who had previous surgery and unilateral prominent ear were not included in the study. The patients were divided into two groups based on their gender and the groups were evaluated within themselves. The mean age of all patients was 18.10 ± 5.92 years. Both the efficacy and recurrence status of this operation was evaluated by measuring the distances between the three different points (upper, medium and lower) of the helix of auricle and the skull in before and 6th months after the operation (Figure 1). Based on the measurements that were taken at the 6th month after the surgery, the distances ≤ 19 mm were accepted as successful, whereas ≥ 20 mm was accepted

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Correspondence:
Bekir Atik, Department of Plastic and Reconstructive Surgery, Istanbul Medeniyet University, Idealtepe Neighborhood Namik Kemal Street: 82, Maltepe/Istanbul, Turkey, Tel: 00.90.532-2525720; E-mail: drbekiratik@yahoo.com

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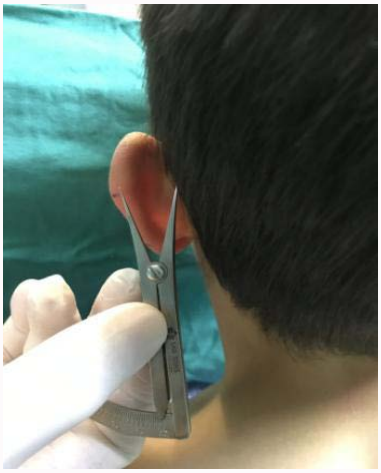

Figure 1: Measurement of the distance between the ear and the mastoid.

Figure 2: External view of Posterior Auricular Muscle (PAM).

Figure 3: Dissection of the PAM and the Primary Plica (PP) in surgery.

as relapse (Table 1).

Surgery

All surgeries were performed under local anesthesia. After the local anesthetic infiltration into the skin behind the ear, the skin was excised thinly. Dissection was continued posteriorly through the perichondrium and the posterior auricular muscle was found (Figures 2-4). The muscle was dissected, released from where it adhered to the concha (Figure 5) and a stitch was left on the edge for later use. Then the mastoid fossa was dissected, the periosteum was found and the place where the concha was going to be embedded was prepared. Then, a pocket was prepared on the turbinate, going up enough to the primary plica to fixate the posterior auricular muscle.

Figure 4: Harvesting of the PAM from its normal position to advance to the PP.

Figure 5: Prepared of concha-mastoid sutures.

Figure 6: Fixation of the PAM to the PP.

Then 3 concha-mastoid sutures were prepared, the concha was sutured to the periosteum of the mastoid region and embedded in the mastoid fossa. The prepared mastoid fascia was sutured onto

Figure 7: Anti-helical fold was formed.

the concha at three equal points (Figure 6). The posterior auricular muscle was then advanced to the area where the primary plica was located, and it was fixed with a mattress suture. Thus, an anti-helical fold was formed (Figure 7). Even if not in every patient, the skin was closed by placing a concha-head suture superiorly and inferiorly.

Video 1: Operation process of PAMP.

Statistical method

The preoperative and postoperative values of all patients were recorded in mm. Descriptive statistics, mean and standard deviation (mean ± SD) values of all patients were measured using the Microsoft Office Excel 2013 program. Preoperative and postoperative 0 and 6th month measurements of both groups were compared with the student's t-test. The p values less than 0.05 were considered significant.

Results

The average distance values between the preop and postop right and left ear 3 points (S, M, and L) and the skull of the 20 patients included in the study and the p values obtained after comparison of these two groups are given in Table 1. According to these values, there was a statistically significant difference between; preop right and left ear S, M and L, and postop S, M and L distance values in all patients (Table 1). No recurrence was ob-served in any of the cases according to the measurements at the 1st and 6th months in all cases. There was a significant statistical significance between preop and postop right and left ear distance values in both boys and girls when separated by their gender.

Discussion

In Luckett's article, while the ear pit is in normal size and localization in the prominent ear deformity, the ear is largely separated from the head and appears with a defective antihelix that is undeveloped or missing. Indeed, the main disorder in the studies carried out over the years is that the folds of the antihelix do not form,

Table 1: The average distance values between the preop and postop right and left ear.

Number	age	sex	Preop-RS	Preop-RM	Preop-RL	Preop-LS	Preop-LM	Preop-LL	postop-RS	postop-RM	postop-RL	postop-LS	postop-LM	postop-LL
1	19	0	22	24	20	20	20	18	16	16	16	15	15	15
2	24	0	20	23	20	20	20	23	13	15	16	13	15	13
3	8	0	25	30	18	22	30	20	12	14	15	11	12	14
4	27	1	25	21	18	28	35	22	11	12	12	12	13	13
5	16	1	20	26	20	20	30	20	12	13	12	11	14	10
6	17	0	13	30	20	20	31	25	10	12	13	12	13	15
7	23	0	20	26	17	15	25	14	14	11	10	13	14	15
8	24	0	13	24	16	14	15	13	10	14	11	11	11	12
9	21	1	20	25	19	19	27	18	12	12	11	13	13	12
10	16	1	25	27	26	26	29	26	15	18	14	15	14	16
11	13	1	12	22	19	15	21	15	12	13	13	12	12	12
12	18	0	26	20	20	23	21	20	15	12	14	13	11	12
13	17	0	22	24	20	24	24	21	13	12	11	10	10	11
14	32	1	26	27	24	27	27	23	12	10	11	10	11	10
15	22	1	18	20	16	22	20	17	8	10	12	10	10	12
16	17	0	21	20	18	14	16	12	11	10	9	9	10	8
17	15	1	22	24	20	19	21	18	8	7	10	8	8	9
18	9	0	24	25	22	17	19	16	11	12	9	10	11	9
19	13	0	25	28	18	29	29	23	11	12	9	10	13	10
20	11	0	30	32	26	30	31	27	13	12	13	15	12	14
Mean	**18.1**		**21.45**	**24.9**	**19.85**	**21.2**	**24.55**	**19.55**	**11.95**	**12.35**	**12.05**	**11.65**	**12.1**	**12.1**
SD	**5.92**		**4.61**	**2.74**	**2.74**	**4.83**	**5.47**	**4.18**	**2.06**	**2.31**	**2.13**	**1.96**	**1.81**	**2.23**
t test			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
p ≤			**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**	**0.00001**	**0.0001**	**0.00001**
p ≥														

and the concha leaves the temporal region. Although many surgeries have been described, the anatomical defect in the concha has not been emphasized much. In some studies, although concha mastoid sutures should be used for prominent ear repair, the concha was attached to the temporal bone only with regular sutures. Over time, loosening and breaks in the sutures caused the concha to reopen. In the clinical and anatomical study published in 2017, Olivera emphasized the definition of primary plica and described this fold as the fold between the antihelix and antitragus [4]. This point is the region where the transverse auricular muscle, which is the main muscle fixing the antihelix to the concave, adheres to the concha and then extends to the antihelical body. Thanks to this muscle and fibrous structure, the primary plica is formed. In his anatomical study, Olivera said that this muscle was not present in the prominent ears and emphasized that it is very important to create this fold in clinical applications and said that the antihelical fold can be formed completely with the help of a suture. Many authors have done this with concha scaphal sutures, but have not chosen the primary plica as a key point [9].

In our cases, we observed that the transverse auricular muscle was inadequate in that area. We think that this region is of special importance (Figure 1). However, we believe that it is an important force holding the concha in the posterior auricular muscle and mastoid fascia among the structures that fix the concha to the temporal fossa. Because, while the muscles are in place in the prominent ear, we see the concha completely detached and protruding into the anterior. A valid determination of this region will move the concha to its natural location and prevent a recurrence. Also, we observed that the posterior auricular muscle, which is one of the muscles fixing the concha to the temporal region, is pro-longed with the concha that opens forward, and it is inadequate to hold the concha (Figure 2, 3). We thought it might be like an intervention in the levator muscle in cases of blepharoptosis. If the muscle function is insufficient in blepharoptosis, either the muscle is shortened, or it is separated from the muscle and sutured to an anterior region. In the cases of the prominent ear, we separated the posterior muscle from the point where it adhered and used it instead of the transverse muscle and advanced it to the PP point. Yazici et al. [10] pulled the concha backward by suturing the posterior muscle onto the concha in their 2008 study. Although this is a correct approach, they did not use this muscle instead of the insufficient transverse muscle.

By moving this muscle to the primary plica point, only the antihelical fold can be created. Olivera used sutures when creating PP. However, relapse or rupture in sutures will make relapse inevitable. We created the primary plica using the posterior muscle. Thus, we achieved a dynamic structure and eliminated the risk of loosening sutures. In most of the prominent ears, concha is excess. However, this excess concha is caused by the turbulence of the concha out of the base of the mastoid fascia. Some authors prefer to cut this excess in the concha [1]. However, in these applications, it creates breaks in cartilage, and it looks bad from the outside. Instead, the excess of the concha will disappear by embedding the mastoid fascia into the cavity that has opened in its anatomical location at the base [7]. We embedded the concha in the void that we opened in the temporal region without making any incisions on the concha. Thus, the posterior muscle adhered to the temporal fascia level. We covered it on the concha in the flap we created from the temporal fascia. Here, although we embedded the concha with the help of sutures, the concha was firmly fixed with the temporal fascia. With this technique, it was possible to move both the scalp and concha to the anatomical location using the muscle and fascia flap. We think that with this technique, performed with the help of muscles and flaps, the sutures may not be visible behind the ear, as well as recurrences due to the slackening of the sutures. We attribute the statistically significant difference in preoperative and postoperative results to the 6-month results, after the threads are loosened; the muscle adheres tightly to the concha.

Conclusion

The most important target in prominent ear treatment is to bring the concha and primary plica into the anatomical position. Other regions have less priority on the ear shape. The sutures used in the treatments get loose over time and relapses appear especially in the older treatments. In this study, recurrence was successfully prevented by supporting both adaptive and alive tissues such as primary plica, muscle, and fascia.

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