Comparison of the Effects of Spreader Graft and Overlapping Lateral Crural Technique on Rhinoplasty by Rhinomanometry

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ABSTRACT

BACKGROUND
Nasal valve collapse and especially internal nasal valve insufficiency is a common cause of nasal airway obstruction. This study compares the effects of spreader graft and overlapping lateral crural technique on rhinoplasty by rhinomanometry.

METHODS
Fifty patients were randomly assigned into two groups and underwent spreader graft or overlapping lateral crural technique. Objective assessment was performed by clinical examination and rhinomanometry before and after rhinoplasty.

RESULTS
Nasal obstruction had no significant difference before and after rhinoplasty and no significant difference was observed between surgical techniques. Right, left and total nasal flow and resistance were different before and after surgery but were not significant. Base of the nose was not significantly different between two groups, but nasal projection was 2 mm in the group who underwent overlapping lateral crura technique and the difference was statistically significant. Our study showed that both overlapping lateral crura and spreader graft technique were beneficial in rhinoplasty and they could provide enough internal nasal valve support. The overlapping lateral crura was an appropriate surgical technique for tip projection in comparison to spreader graft.

CONCLUSION
The overlapping lateral crura technique was shown to be a better surgical way for tip projection in comparison to spreader graft.

KEYWORDS
Spreader graft; Lateral crural technique; Rhinoplasty; Rhinomanometry

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INTRODUCTION

Breath is a life performance that results into oxygenation of the
Nasal valve collapse and especially internal nasal valve insufficiency is a common cause of nasal airway obstruction. The internal nasal valve stenosis can be congenital or caused by trauma or complications of previous surgery or dropping nasal tip.\textsuperscript{4,5} Weakness in the superolateral cartilage and narrowing the valve can cause stricture and blockage of the nasal passages, collapse of the lateral nasal wall and exacerbate asthma, especially in patients at increased during breathing through the nose.\textsuperscript{6,7} In evaluating dyspnea, different methods are used. One of these methods is nowadays considered approach of rhinomanometry that the air flow is resistant and is simultaneously measured.\textsuperscript{8-12}

Today, the most common technique used for structural reform under the nose is rhinoplasty.\textsuperscript{13} Although many techniques have been devised to correct both the functional and aesthetic aspects of this problem, none is uniformly successful. One of the most common techniques used in structural reform is spreader graft and the other technique used in the field is overlapping lateral crural.\textsuperscript{14-16} In all these techniques the patient’s postoperative function improvement is important.\textsuperscript{17} Techniques can be compared with each other by subjective methods as questionnaire or using objective (paraclinical) methods such as rhinomanometry.

Most of studies for this technique are based on clinical examination and change of postoperative complaints and are not very precise to reveal the advantage of one technique over another. Therefore, recent studies have focused on clinical aspects such as rhinomanometry to compare the surgical techniques. In this study, we compared the common complaints of the patient’s rate of recovery with one objective method (rhinomanometry). This study compares the effects of spreader graft and overlapping lateral crural technique on rhinoplasty by rhinomanometry.

**MATERIALS AND METHODS**

The present study is a clinical trial on patients for elective surgery of nose (rhinoplasty) with two techniques of spreader graft and overlapping lateral crural. The study was undertaken in Al-Zahra Hospital. Rhinomanometry was done in two stages before and three months after surgery. We included patients with no clinical problems and individual consent to participate in research projects. Exclusion criteria were structural problems such as nasal obstruction, a brief history of the deformity requiring rhinoplasty deviated septum, hardening surgery, an unwillingness to continue participation in the plan, new clinical conditions or a change in therapeutic techniques and lack of access to patients referred for evaluation of a person after the operation.

Rhinomanometry was done with the Recommended International Standards Committee and was performed in a facility by a technician. After rhinomanometry, patients were randomly divided into two groups and surgeries were performed by a group of surgeons. One group of patients with spreader graft and others were operated by overlapping lateral crural technique. Patients were monitored for a month after surgery and then again after three months under the same initial conditions undertaken by rhinomanometry. In two stages of rhinomanometry, nasal resistance was evaluated by Pascal per millilitre per second (Pa/mL/s). The right and left and total nasal flow index were evaluated in two groups by millilitre per second (mL/s).

In two stages of rhinomanometry, the clinical complaints of patients were assessed by the standard Visual Analogue Scale (VAS). Anthropometric characteristics of patients (base and tip projection of the nose) were measured by taking photo and computer imaging technique preoperative and postoperative. Finally, the data were analyzed by the SPSS software (Version 18, Chicago, IL, USA). Data were expressed as mean±SD. Dependent T test and ANOVA were used for data analysis. The significance level was considered as p <0.05. Ethical principles of the Declaration of Helsinki have been under consideration.

**RESULTS**

In this study, 50 patients were enrolled. In
spearer graft group, 19 men (76%) and 6 women (24%) and in lateral crural overlapping group, 17 men (68%) and 8 women (32%) participated. Mean age of patients in spearer graft group was 35.6±14.9 and in overlapping lateral crural group was 37.1±17.1 years.

Before rhinoplasty, based on a medical examination and rhinomanometry findings, 3 patients (6%) had mild obstruction and 47 patients (94%) had no obstruction. After spearer graft technique, 2 patients (8%) had mild obstruction and 23 patients (92%) had no complaint. Following overlapping lateral crural technique, 1 patient (4%) had mild obstruction and 24 patients (96%) had no complaint. Statistically, based on medical examination and rhinomanometry findings, nasal obstruction had no significant difference before and after rhinoplasty and no significant difference was observed between surgical techniques (P>0.05).

Before rhinoplasty, based on clinical complaints of obstruction, 1 patient (2%) had mild obstruction and 49 patients (98%) had no complaints. After spearer graft technique, 1 patient (4%) had mild obstruction and 24 patients (96%) had no complaint. Following overlapping lateral crural technique, 1 patient (4%) had mild obstruction and 24 patients (96%) had no complaint. Statistically, based on clinical complaints, nasal obstruction had no significant difference before and after rhinoplasty and no significant difference was observed between surgical techniques (P>0.05).

The results of this study showed no significant difference in nasal obstruction before and after surgery in each group and between two groups. As we enrolled patients with no clinical problems, obstruction and rhinomanometry did not change significantly between groups but rhinomanometry findings decreased after surgery.

Rhinomanometric indexes decreased 3 months after surgery, because inflammation was observed in clinical examination at the site of surgery. The important problem was internal nasal valve insufficiency and obstruction after rhinoplasty. So using techniques to reshape and add structure to the lateral crural to create the desired lateral crural contour can provide sufficient alar rim and internal nasal valve support.

In Okhovat et al. study, rhinomanometry was performed on 48 patients before and after septoplasty. The findings indicated that in addition to reduction in symptoms of obstruction, rhinomanometry showed an increase in flow rate and the total flow on both sides of the nose and a reduction in resistance to objective results. It can be recommended as a way to evaluate the results of septoplasty and to predict structural reforms.18 Also Jassen and colleagues evaluated the effect of rhinomanometry on 92 patients undergoing rhinoplasty. Rhinomanometry findings revealed an improvement among 56 patients with midline deviation and in 36 patients without any septal deviation.19 Tombu's study showed that the evaluation of rhinoseptoplasty results

| Table 1: Rhinomanometry results before and after two methods of surgeries |
|---------------------|---------------------|---------------------|---------------------|
| Rhinomanometric index | Mean±SD preoperative | Mean±SD after spearer graft (postoperative) | Mean±SD after lateral crural over lapping (postoperative) |
| Right nasal flow      | 350.60±133.17        | 345.86±134.63        | 340±129.34          |
| Left nasal flow       | 411.22±141.17        | 405.53±181.01        | 399.34±192.19       |
| Total nasal flow      | 761.82±267.87        | 751.39±255.09        | 739.94±260.50       |
| Right nasal resistance| 0.40±0.48            | 0.45±0.24            | 0.51±0.33           |
| Left nasal resistance | 0.43±0.66            | 0.49±0.40            | 0.57±0.39           |
| Total nasal resistance| 0.19±0.24            | 0.20±0.14            | 0.22±0.16           |

(Right, left and total nasal flow based on mL/s and right and left and total nasal resistance based on Pa/mL/s).
via rhinomanometry denoted to an effectively
improved surgical techniques, although further
studies are needed to evaluate the usefulness
of these techniques.\textsuperscript{20} In another study, Tiukin
showed that rhinomanometry technique can be
compared with various surgical procedures in
the practical use.\textsuperscript{21}

There are more studies to compare
techniques together such as spreader graft
and overlapping lateral crural method. For
example in one study, the efficacy of surgery of
Apaydin lateral crural turn-in flap in relieving
of nasal structural abnormalities in 24 patients
showed that this technique could improve the
performance of reform and opening internal
lateral crural technique to be effective.\textsuperscript{22} Janis
and colleagues in a retrospective study on 23
patients who underwent lateral crural turnover
flap rhinoplasty procedure showed that this
technique could be very effective on structural
reforms and deformity including internal valve
stenosis.\textsuperscript{23} Also, Boccieri \textit{et al.} followed up 60
patients with structural abnormalities after spreader graft procedure and showed that none
of the patients complained from physiological
disorders such as sparseness and self-induced
internal valve dysfunction.\textsuperscript{24} In all these studies,
there were no objective methods for patient
examination. To compare existing techniques
without using rhinomanometry and based on
clinical signs and symptoms, overlapping lateral
crural has been more effective in improving
nasal tip although there are numerous studies
showing that the spreader graft method was
effective in improving the nasal structure and to
prevent nasal valve collapse.\textsuperscript{25}

Nasal tip reform greatly is dependent on the
surgical technique. These studies on lapping
lateral crural procedure were similar to our
results. So in Wise and colleagues study, the
projection improved in all patients.\textsuperscript{26} Also the
modern approach to functional rhinoplasty
considered the importance of the tip framework’s
structural integrity. Sazgar \textit{et al.} performed
rhinoplasty on 5 patients by using overlapping
lateral crural technique. This preliminary study
showed that the hinged flap was an option in
nasal tip reduction surgery that may provide
an improvement in long-term aesthetic and
functional outcomes through preservation of the
nasal valve area.\textsuperscript{27}

These results are similar to our study regarding
tip deprojection. Their study showed that
overlapping lateral crural technique improved
functional outcomes through preservation of the
nasal valve area. Our results could not support this
finding because we did second rhinomanometry
three months after rhinoplasty. However clinical
examination showed inflammation in the site of
surgery, so we needed more time for patient’s
examination to get better results. Also Hossam
\textit{et al.} showed that in lateral crural overlay, there
were an increase in tip rotation and a decrease
in tip projection. They used computer imaging
technique for assessment.

We included the patients for cosmetic
rhinoplasty and suggested comparing of the
technique on patients with clinical problems such
as severe concavities and nasal obstruction by
using dynamic objective methods for assessment
in future studies. Due to inflammation at the
site of surgery, our result was not significant in
second assessment, so we suggested that patient
evaluation must be done in longer periods.

In conclusion, overlapping lateral crural and
spreader graft were useful surgical techniques
in rhinoplasty and they could provide enough
support for internal nasal valve but overlapping
lateral crural procedure was an appropriate
surgical technique for tip deprojection. Use of
other techniques with overlapping lateral
crural may be more imperative. The results of
the present study showed the effectiveness of
both techniques for patients, but it is necessary
to explain that each technique has specific
application and can not be replaced by another
and a plastic surgeon can select an effective
technique for each patient according to aesthetic
and therapeutic parameters.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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