

# Rhinoplasty Complications and Reoperations: Systematic Review

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## Abstract

**Introduction** This article is related to complications of rhinoplasty and its main causes of reoperations.

**Objectives** The objective of this study is to perform a systematic review of literature on complications in rhinoplasty.

**Data Synthesis** The authors conducted a survey of articles related to key terms in the literature by using three important databases within 11 years, between January 2002 and January 2013. We found 1,271 abstracts and selected 49 articles to this review.

**Conclusion** The main results showed that the number of primary open rhinoplasty was 7902 (89%) and 765 closed (11%) and the percentage of reoperations in primary open complete rhinoplasties was 2.73% and closed complete was 1.56%. The statistical analysis revealed a value of  $p = 0.071$ . The standardization of terms can improve the quality of scientific publications about rhinoplasty. There is no difference between primary open or closed rhinoplasty techniques in relation to reoperations.

## Keywords

- ▶ postoperative complications
- ▶ surgical revision
- ▶ rhinoplasty

## Introduction

Rhinoplasty is one of the most complex surgical procedures in plastic surgery. The nose, with its three-dimensional anatomical traits and complex function, interfere with emotional, respiratory, bio-behavioral and immunological factors. Rhinoplasty is a procedure widely sought after by patients because a change in center-facial aesthetics becomes very evident. All these factors influence the planned procedure and post-operative questions. So the detection of the major complications can help surgeons in surgical techniques and in guidelines to patients about the limits of procedures. Secondary rhinoplasty occurs for two main reasons: dissatisfaction with the expected result and incorrect technique or assessment of nasal anatomy. Compared with the primary rhino-

plasty, surgical revision is even more difficult because its main objective is to modify the functional defects or cosmetics after complaints that a previous procedure was not successful according to the patients' expectations.<sup>1</sup>

Our study is a case series analysis, where we have a certain technique, the description of patients, and their results. A recent way to evaluate results is the questionnaire on quality of life (QOL) and, more specifically, the Rhinoplasty Outcome Evaluation (ROE) or Rhinoplasty Outcomes Assessment. The latter consists of six questions, two for each factor considered critical to patient satisfaction (physical, emotional, and social). Quality of life can be defined as the individual's perception of their position in life in the context of culture and value systems in which they live, and in relation to objectives, expectations, standards, and concerns.<sup>2</sup>

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We conducted a systematic review based on a literature search of scientific articles indexed or not, with similar characteristics, but that alone has little value. Once grouped, the results can achieve a greater significance level. This method is among the most important tools in response to clinical and surgical issues. A systematic review (synonyms: systematic overview; overview; qualitative review) is designed to answer a specific question and uses explicit and systematic methods to identify, select, and critically evaluate studies, allowing researchers to collect and analyze the data from the studies included. Statistical methods (meta-analysis) may or may not be used in the analysis and synthesis of the results of the included studies. Thus, the systematic review relies on such comprehensive structuring to avoid bias in each of its parts.<sup>3</sup>

The objective is to define the reoperation rate, the main complications, and causes of secondary surgery in rhinoplasty based on the systematic literature review and possible development of a meta-analysis.

### Review of Literature

We conducted searches in MEDLINE, COCHRANE, SCIELO, LILACS SCIRUS, and PUBMED CENTRAL databases. The terms used in the English language were “rhinoplasty and outcomes,” “revisional rhinoplasty,” “rhinoplasty complication,” “secondary rhinoplasty.” The research period was limited to 11 years between January 2002 and January 2013, as well as research in humans and in English (►Table 1). We assessed article summaries in English, Portuguese, Spanish, and French. Once selected, the researchers converted the full articles into Microsoft Word for analysis. The search generated over 98 references analyzed according to the criteria below.

Inclusion criteria: number of cases with primary and / or secondary rhinoplasty, in which we could detect: the number of cases, age, sex, duration, or follow-up, change that motivated procedure, technique used, complications, and re-operations.

Exclusion criteria: language used is not accessible to researchers, number of cases relating to tumors, complex post-traumatic reconstruction, use of allografts, rhinoplasty for cleft patients, children, the absence of: number of cases, age, duration or follow-up, which would have led to procedure, technique, complications, and re-operations.

**Table 1** Results obtained following the search terms

Terms used	Results
rhinoplasty and outcomes	647
rhinoplasty and roe ROE	9
rhinoplasty and quality of life	38
revisional rhinoplasty	170
rhinoplasty complication	105
secondary rhinoplasty	204
reference of the articles selected	98
Total	1271

**Table 2** Terms used to group preoperative complaints

Unaesthetic scar in columella
Columella changes
Tip changes
Supratip changes
Alar changes
Nostril changes
Middle valve changes
Nasal bone changes

Once we selected the abstract, we read the article for data collection. We filed all selected articles in the Mendeley platform. The initial Excel table was filled by creating two large subdivisions; the first relating to the grounds and / or surgical findings and the second related to the procedures used, complications, and secondary surgeries. Then, we worked on each of these divisions and grouped data again according to ►Tables 2 and 3. There were two large analyses, one referring to patients of primary rhinoplasty series and the second concerning series of secondary cases. We ran the information from the Excel table through a statistical analysis.<sup>1,4-50</sup>

Research has found 1271 articles evaluable. Of these we selected 151 articles that potentially met the inclusion criteria. After studying the articles, 49 were included in the survey.

As described in ►Table 4, three articles (6.12%) used ROE or QOL, one (2%) had grade of recommendation 3b, and 48 (98%) had recommendation grade 4.

The total rhinoplasty found in selected studies was 11035, and 9655 (87.5%) primary and 1380 (12.5%) secondary.

In primary rhinoplasty taken together, we find as preoperative complaints: 61.0% nasal tip, 2.2% nasal valve, 8.0% nasal wing, 19.6% nasal dorsum and 9.0% nasal pyramid. ►Figs. 1 and 2.

In complete primary rhinoplasty, the average age was 30.5 years. The females totaled 75.1% of cases and 24.9% of male cases. The average time postoperative follow-up was 25 months. The number of complete primary open rhinoplasty was 7902 (89%) and was closed 765 (11%). The percentage

**Table 3** Terms used to group accomplished procedures

Tip definition
Grafts in nasal tip
Grafts in nasal wing
Alectomy
Grafts stake
Graft expanders middle nasal valve
Procedures in nasal columella
Grafts in the nasal dorsum
Osteotomies
Nasal dorsum reduction

**Table 4** Articles with use of ROE or QOL, Degree of Recommendation and Level of Evidence

Total articles	49 (100%)
ROE or QOL	3 (6.12%)
Degree of Recommendation 4	48 (98%)
Degree of Recommendation 3	1 (2%)
Level of Evidence 4	48 (98%)
Level of Evidence 3B	1 (2%)

of reoperations in complete primary rhinoplasty by open surgery was 2.73% and the complete closed was 1.56%, and the statistical analysis showed a value of  $p = 0.071$ .

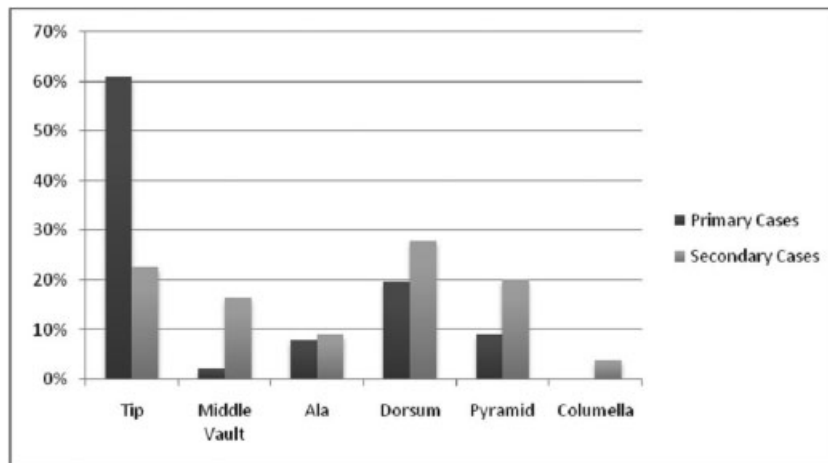
Individually analyzing the closed surgery, only to access the bone pyramid and middle third (untreated nasal tip) we found 814 cases with reoperation rate of 1.47%.

Regarding allectomias have been reported 174 cases with 4.79% complication rate.

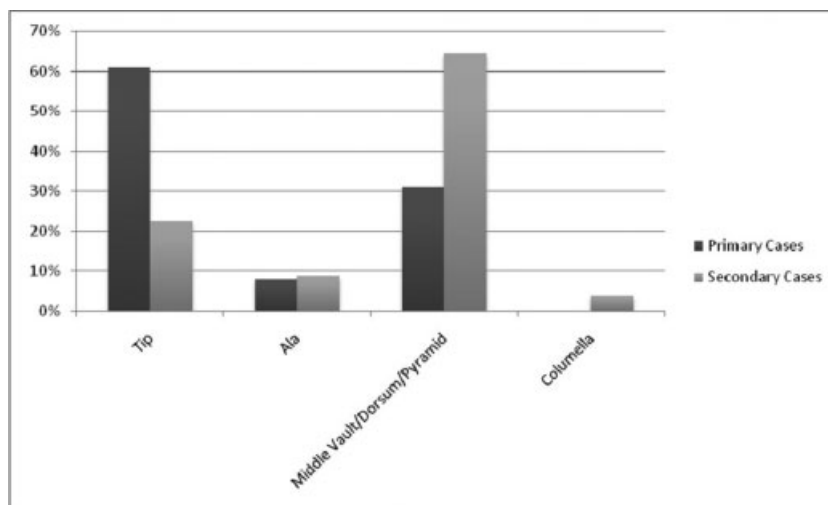
In the group of surgeries classified as secondary, we detected 1380 cases of which 593 (43.0%) were operated by closed access and 279 (20.2%) as open; it is not possible to compare the two groups. The reoperation rate in this group as a whole was 1.73%. Changes that motivated the surgery were: 22.5% nasal tip, 16.4% nasal valve, 8.9% nasal wings, 27.9% nasal dorsum, 20.1% nasal pyramid and 3.9% columella nasal. ► **Figs. 1** and **2**.

**Discussion**

When we study the selected articles we see almost all simple case series reports. Describe certain technique or type of anatomical alteration. The use of ROE or QOL was very limited and the degree of recommendation and level of significance was also not very significant, as seen in ► **Table 4**. These works do not reduce the degree of impact of a systematic literature review because the set of similar cases is which will result in a reliable and significant study. When we see such a large number of works without the use of ROE or QOL, with low



**Fig. 1** Percentage alterations found in primary and secondary rhinoplasty.



**Fig. 2** Percentage alterations found in primary and secondary rhinoplasty with grouping of the alterations in valve, dorsum and pyramid in relation to nasal tip.

impact and improper methodology requires us think about how these studies have been done compared with the other ENT subspecialties. Another important finding was the large amount of terms and techniques that are used in nasal anatomy. This brings problems in the grouping of data and treatment options. Obviously, a first step toward comparable articles to each other would be the standardization of the nomenclature and usage techniques. If we have low-impact articles, we also have a wide field of study, in which Works with good design and systematic will guide effective treatment methods with scientific value.<sup>2</sup>

To compare the data found there was need for grouping of key terms found in the preoperative period, the technique used and postoperative findings. This option does not compromise the findings, once it we do not determine if a technique is superior to another. The findings may in the future mark out other work. A systematic review of literature can also demonstrate the impossibility of obtaining comparable and reliable results.<sup>3</sup>

For reviewing the articles we determine a large number of rhinoplasty, 11035 cases and 9655 (87.5%) primary and in 1380 (12.5%) secondary, mostly in women. Regarding the preoperative alterations, there was a reversal of the prevalence, and the nasal tip (61.0%) more found in primary surgeries and valve-dorsum-pyramid set (64.4%) in the secondary. This can be explained since the primary rhinoplasty series seek to describe any technique or specific changes. Already in secondary rhinoplasty series we see that nasal tip changes do not lead to the majority of reviews, but the changes valve-dorsum-pyramid. This may be a reflection of the inexperience of first surgeon or low reporting on items that specifically describe nasal tip changes.

The comparison between the process of open and closed access in complete primary rhinoplasty in relation to the percentage of reoperations showed a statistical analysis with  $p = 0.071$ . So there is not statistical significance in the choice of open or closed access. This shows that there is not better access, leaving the surgeon responsible for the choice of which technique to use, taking into consideration the indication for the procedure, the experience of the professional and the limitation of the surgical technique, among other factors.

The closed technique to access the nasal bone pyramid in the middle third, without nasal tip manipulation has low complication (1.47%), similar to closed rhinoplasty.

The alectomy was the procedure with the highest complication rate (4.79%), alerting us of its importance, since its correction is difficult to treat.

In secondary surgery (1380 cases), only 60.3% specified the prior access (43.0% closed and 20.2% open), making it difficult to compare these groups. The recovery rate of these patients (patients who underwent a tertiary surgery) is low (1.73%). However, this does not reflect patient satisfaction, due to the lack of questionnaires such as the ROE and QOL. The American literature had the greatest number of publications available. In the United States, the open technique is present in most surgeries. As for South America, the endonasal technique is preferred.<sup>1</sup>

## Final Comments

The scientific literature that addresses the theme rhinoplasty is increasing. There is still a limitation of articles with a good level of evidence and the standardization of terms could facilitate and increase production within this literary theme. The use of standardized questionnaires, such as the ROE and the QOL, with the choice of appropriate design and systematic production can enrich the literature on this topic and make the evaluation more objective as a result.

The choice of surgical approach does not interfere in the reoperation rate in primary cases.

We have a high reoperation rate in alectomies.

The secondary surgeries occur mostly by change valve-dorsum-pyramid.

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