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# Learning Curve and Septorhinoplasty

Aditya Yeolekar

## Abstract

The learning curve as a concept has been considered and discussed in medical education and surgical practice. Rollin Daniel stated that rhinoplasty is the most difficult of all cosmetic operations for three reasons: (a) nasal anatomy is highly variable, (b) the procedure must correct form and function and (c) patients' expectations. With this in mind, a study was planned on learning curve in septorhinoplasty based on a surgeon questionnaire. The aims of the study were to extract the idea of learning curve from different surgeons across experience about septorhinoplasty, to calculate certain parameters of the learning curve in rhinoplasty and to prepare a roadmap for an early rhinoplasty surgeon. The conclusion derived from the study was the concept of the learning curve in rhinoplasty should not be generalised as certain factors, for example, minimum number to achieve proficiency has a wide range. *It is thought that each type of rhinoplasty should be dealt with separately and learning curve calculated accordingly. A roadmap for a novice surgeon is hereby charted out.*

**Keywords:** the learning curve, septorhinoplasty

## 1. Introduction

The concept of the learning curve was first described in 1885 by Hermann Ebbinghaus (**Figure 1**). It is a graphical representation, where the vertical axis depicts increase in learning as compared to the horizontal axis that suggests experience. It is also referred to as experience curve and productivity curve. In medical terms it can now be described as improvement in one's technical performance over time secondary to increased experience and training [1-5].

The learning curve in surgical procedure (**Figure 2**) has four phases: Phase I is commencement of training—residency (post-graduation, senior residency). Phase II is a stepwise ascent in which individuals' performance improves, and this may take a lot of time (fellowship programme, working at a high-volume centre and working under a senior mentor). Phase III is when a procedure is performed independently and with competence (medical university and private practice). This is followed by a plateau where experience improves progress by only smaller fractions. This is followed by a downward sloping curve due to advancing age.

Therefore, a study was formulated which would help to plan a learning curve in the speciality of septorhinoplasty.

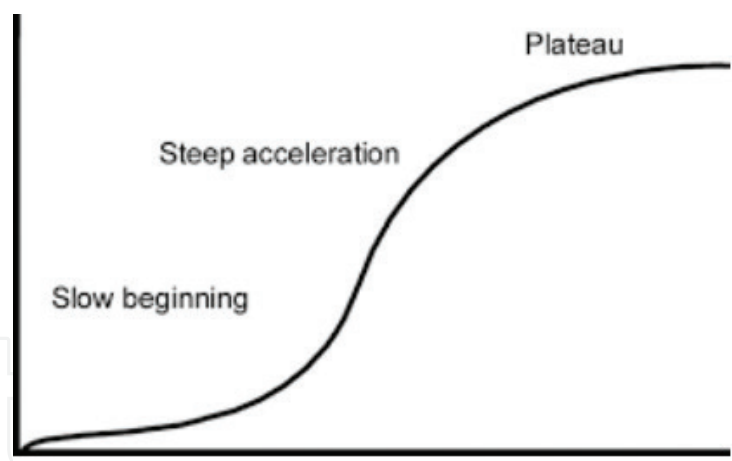


Figure 1.  
The learning curve.



Figure 2.  
A surgical learning curve.

### 1.1 Aims

1. To extract the learning curve of rhinoplasty from surgeons across a spectrum of experience (less experienced to experienced).
2. To calculate the learning curve in rhinoplasty as for other surgical procedures, that is, minimum number of procedures to attain proficiency, surgical time and accelerators to your learning curve.
3. To suggest a roadmap for early career rhinoplasty surgeon.

### 1.2 Methodology

A clinical-based questionnaire was prepared. The study was executed at a workshop attended by rhinoplasty surgeons around the globe. It was completely

Group	No. of open rhinoplasties performed	Number of surgeons
A	0–10	6
B	11–100	11
C	101–500	7
D	More than 500	6

**Table 1.**  
*Surgeon group.*

Group	Range	Mean
A (0–10)	75–100	86.66
B (11–100)	25–80	48.18
C (101–500)	20–100	65.71
D (more than 500)	50–200	108.33

**Table 2.**  
*Minimum number of surgeries required to achieve proficiency.*

Accelerator	Mean
Cadaveric dissection (self)	8.06
Cadaveric dissection (observe)	5.79
Attending workshop/conference	8.1
Analysis of own cases (self)	8.26
Analysis of own cases (expert colleague)	8.6
Writing article/publication	5.1
Observership under expert	9.66
Structured fellowship	9.43
Total no. of rhinoplasties	9.56

**Table 3.**  
*Learning curve accelerators.*

voluntary, and no personal details pertaining to name and place of practice were obtained. Seventy questionnaires were distributed. A total of 30 completely filled questionnaires were obtained and further analysed.

1.3 Observations and results

A total of 30 surgeons participated that included resident surgeons, assistant surgeons, specialist surgeons and private practitioners (plastic/ENT/maxillofacial). It was found that exclusive open rhinoplasty was practised by 20 surgeons whereas open and closed by 10 surgeons.

The participants were distributed into four groups according to the level of experience (**Table 1**).

The lowest number was 0 (resident doctor) and the highest was 3000.

The number of procedures required to achieve proficiency in open rhinoplasty was studied (**Table 2**).

This emphasised that surgeons with lesser experience thought about 86 procedures are to be dealt with to achieve proficiency (i.e. the operation is difficult). The mid-level thought the figure in the range of 48–65 procedures to achieve proficiency. The masters with more experience inarguably stated minimum 100 procedures are required to achieve proficiency. This once again implied the intricacies and complexities of the surgery.

Change in operation time as surgical experience increases was studied. All the four groups thought that as experience grows, one can perform the procedure earlier by about 60 min.

Learning curve accelerators are methods by which one can accelerate the learning curve. Participants were asked to rate the importance of each on a scale of 0–10 (10 being most important) (**Table 3**).

## 2. Conclusion

The minimum number of procedures required to achieve proficiency in open rhinoplasty ranged from 20 to 100 with mean of 76.66 and in closed rhinoplasty from 40 to 200 with mean of 106. It was uniformly opined that as experience grows the surgical time of the procedure reduces by about an hour. The most important accelerators of learning were observership under an expert, well-structured fellowship and number of procedures one performs.

## 3. Discussion

The surgery of septorhinoplasty is difficult to understand even with adequate knowledge because it relies on understanding the various expectations the patient has and the act of delivering consistent results. The surgical techniques used by different surgeons are unique and sometimes not reproducible. It being a highly individualised surgery, no single technique works all the time. A good photographic analysis helps one to prepare a surgical plan be it structural rhinoplasty or a surface rhinoplasty. It surgical procedure addresses various issues: dorsal hump, dorsal deviation, tip, radix and other deformities. The surgical time remains static over one's career or even increases a little by experience in doing additional graft work. Factors like temperament and personality of surgeon might also affect the results. According to W. Gubisch, one can become a good rhinoplasty surgeon only if one can address the nasal septum effectively. In his book on *Advanced Caucasian and Mediterranean Rhinoplasty*, P.J.F.M. Lohius stated that the learning curve depends on genes, exercise and also on luck [6]. Senior Surgeon Rollin Daniel has described few accelerators, namely, detailed preoperative analysis of photos in various view, well-written surgical workflow, use of instruments of good-quality, intraoperative photography and self-explanatory diagrams, analysis of postoperative photos, revision surgeries of own patients, reading the subject, attending meetings for paper presentations and publishing articles [7].

The formulated path in septorhinoplasty:

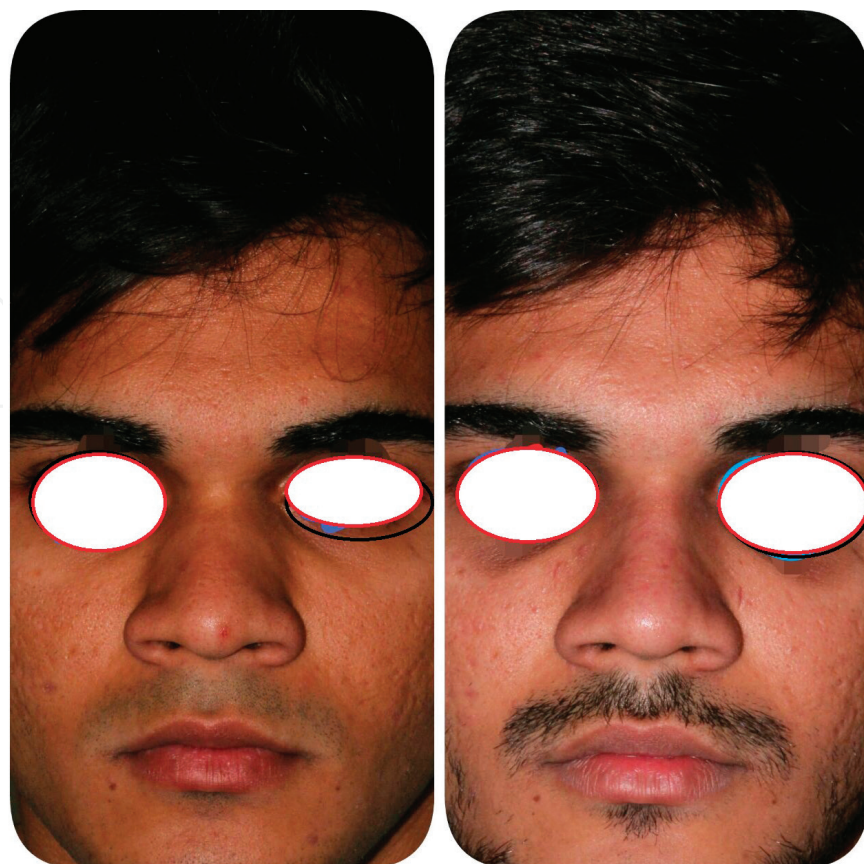
- A. To learn good photography techniques in standardised angles using good lens (macro/ telephoto) with standard lighting environment.
- B. To perform self-analysis of patients' preoperative photographs and devise a plan of surgery.
- C. The single most important point is the correct diagnosis of the deformity so that there are no surprises during surgery.
- D. To discuss your plan or roadmap of surgery with master, mentor or chief operative surgeon.



- E. To assist more than 100 cases of septorhinoplasty as a first assistant both in open and closed rhinoplasty techniques and. to attend to postoperative care and protocols.
- F. To independently perform functional septoplasty or submucous resection of septum, minimum of 100 procedures, to understand septal anatomy better and also perform pre-operative nasal endoscopy to understand intranasal anatomy mainly inferior turbinates and posterior septum.
- G. To watch live operations by experts and surgical videos by stalwarts.
- H. To perform cadaver dissections.
- I. One can use plastic or cardboard cutouts in form of different grafts for practice during cadaveric dissections.
- J. To classify cases according to difficulty, that is, easy, intermediate and difficult rhinoplasty.
- K. In difficult rhinoplasty cases, one should not hesitate to involve another experienced colleague in the surgery.

Cases to be avoided by rhinoplasty surgeon of experience of less than 10 cases are extracorporeal septoplasty, tip plasty, cleft nose, extreme bony deviations, saddle nose, revision cases, pure aesthetic, ethnic nose, multiple deformities and unrealistic expectations. Cases to be avoided by surgeon with experience of more than 10 but less than 100 rhinoplasties are saddle nose, cleft nose, ethnic nose, revision cases and secondary skinny nose.

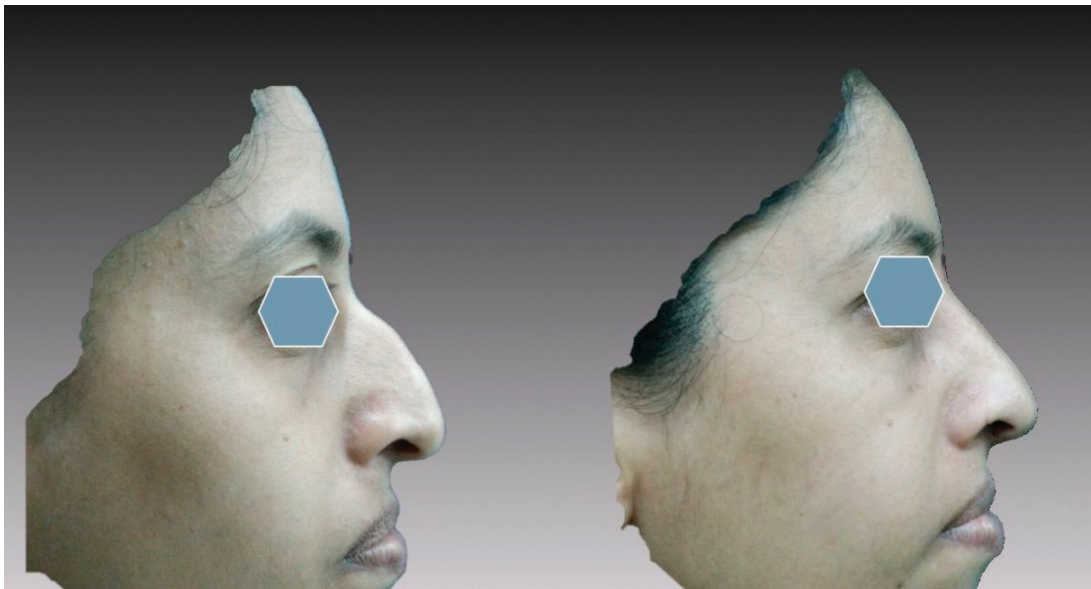
- L. To follow surgical techniques of one mentor repeatedly over 100 operations, improvised with each operation. To incorporate inputs from other surgeons and device your own plan for each subtype of rhinoplasty.



**Figure 3.**  
*Simple case 1: wide dorsum.*



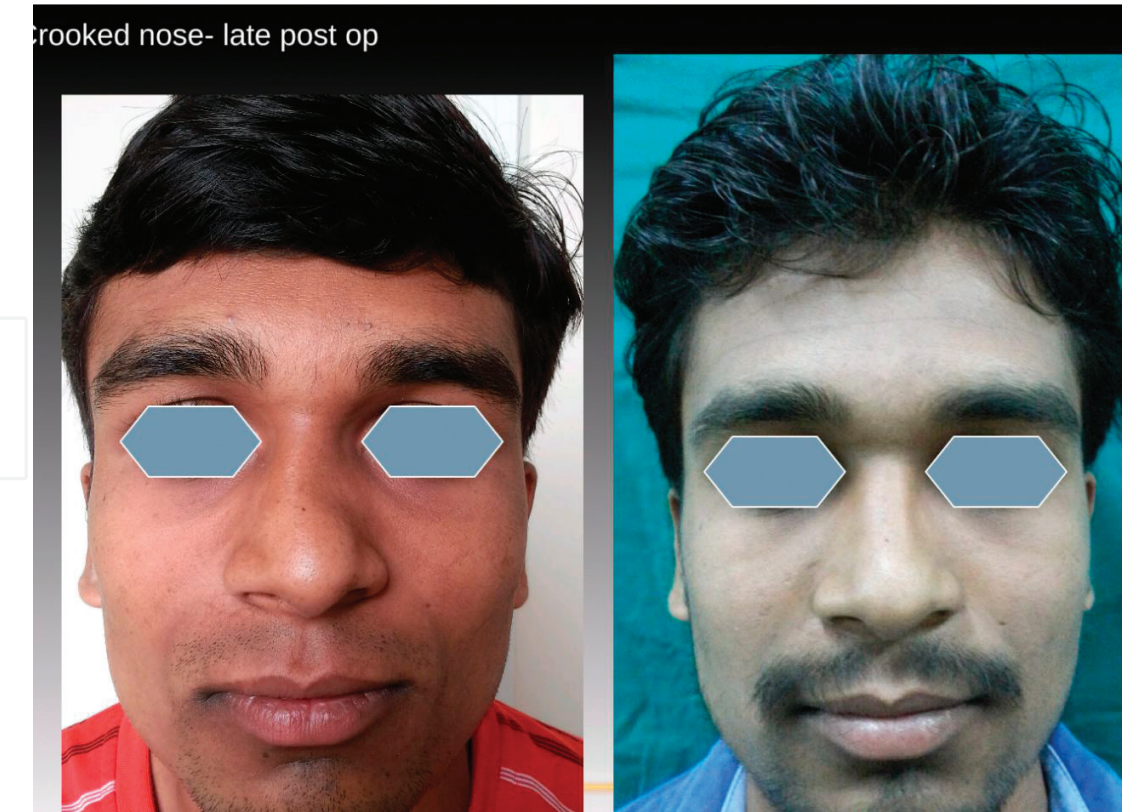
**Figure 4.**  
*Simple case 1: correction of deep radix with free diced cartilage.*



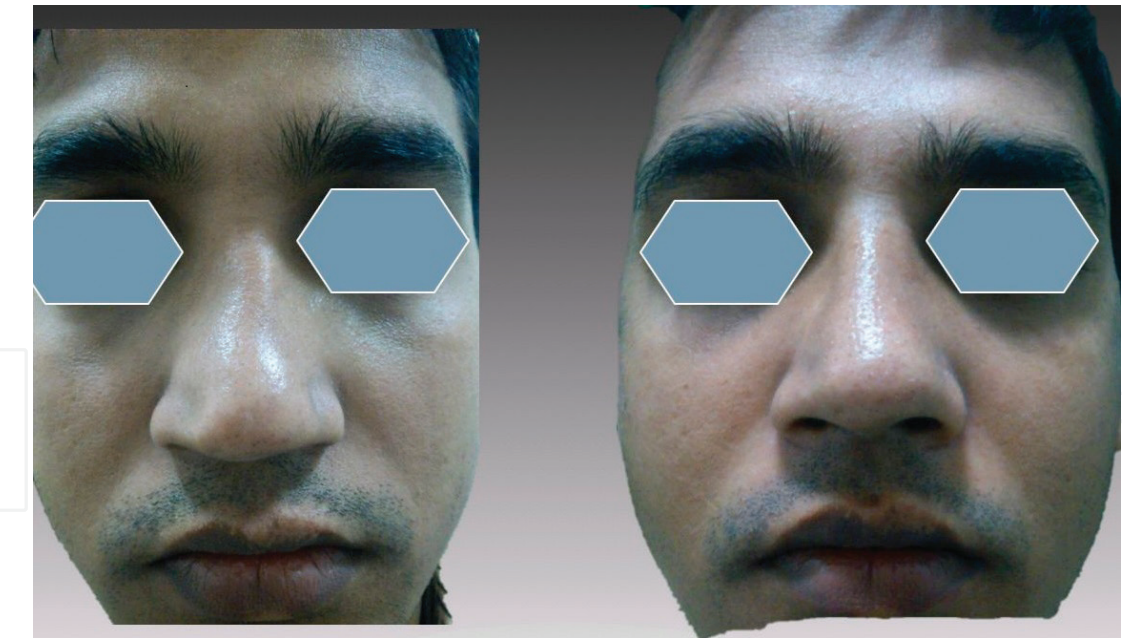
**Figure 5.**  
*Simple case 2: hump nose. Here what would have been better is a supratip break.*

- M. To present one's work at various conferences at local, national and international fora.
  - N. To periodically visit various centres around the globe to understand and update oneself about finer nuances of open and closed rhinoplasty.
- In my honest opinion, one should assist a rhinoplasty surgeon for a minimum 25 cases along with cadaveric dissections and attending courses at established centres around the globe, like the ones at Stuttgart, Bergamo, Milan, Chicago, London, Singapore and the European and American congresses.





**Figure 6.**  
*Intermediate 1: crooked nose with bulbous tip.*



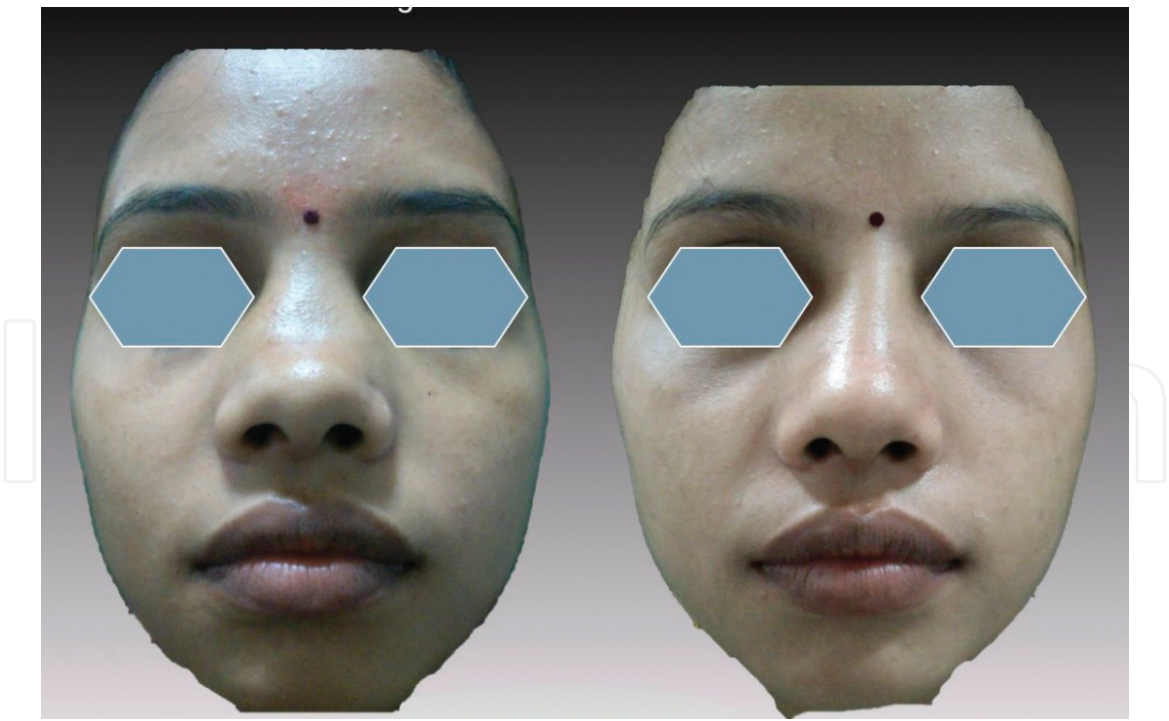
**Figure 7.**  
*Intermediate 2: crooked nose with ptotic tip.*

This should be followed by doing simple cases in presence of your mentor or an experienced surgeon (**Figures 3 and 4**).

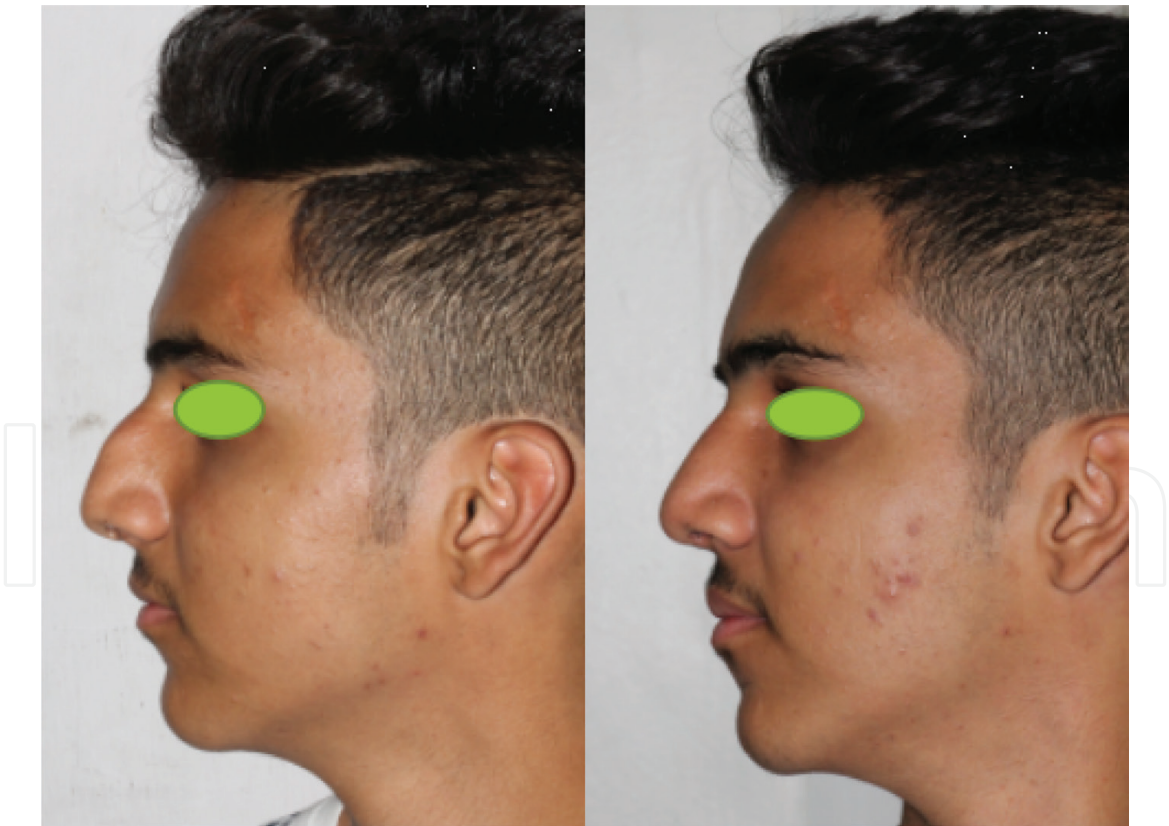
A long-term follow-up of cases should be maintained, and photographic analysis should be compared to pre-op at 6 months and yearly interval. This should be discussed with your senior colleague who shall criticise a point out your mistakes.

This shall help you to undertake intermediate difficult surgeries as follows:



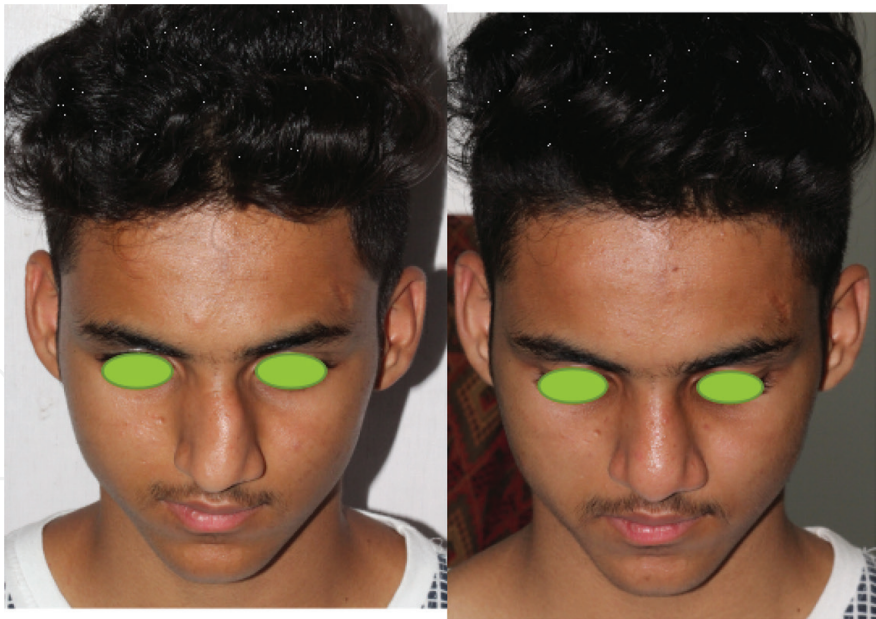


**Figure 8.**  
*Intermediate 3: saddle nose. Repair with costal cartilage.*

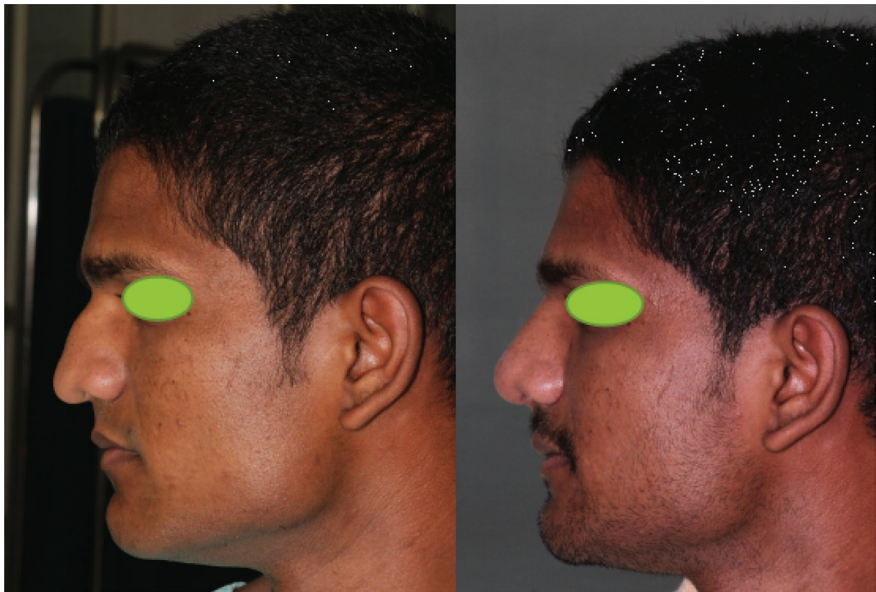


**Figure 9.**  
*Difficult 1: crooked nose with hump with deviated nasal septum.*

This refines your surgery in a better way. Also never hesitate to ask for help from seniors as they themselves have been through similar phases and only they can guide you better rather than being lost (**Figures 5–8**).



**Figure 10.**  
*Difficult 1: requiring extracorporeal septoplasty approach.*



**Figure 11.**  
*Difficult 2: deep radix, wide dorsum with ptotic tip. Extracorporeal approach with tongue in groove repair.*



**Figure 12.**  
*Difficult 3: cleft nose.*

With this approach one can attempt difficult cases as follows:

A happy surgeon-happy patient combination is one for which you should strive for (**Figures 9–12**).

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## **Conflict of interest**

No conflict of interest.

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