surgeons should not feel that they are sacrificing the quality of their patient photographs for convenience.

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Additional Contributions: Norman Koren, MA, of Imatest LLC (Boulder, Colorado). Note the visible film grain in the image. This indicates that the scanner resolution was sufficient to capture all of the detail present in the 35-mm slide.

Figure 4. This slanted line is a close-up of the region of interest analyzed by Imatest LLC (Boulder, Colorado). Note the visible film grain in the image. This indicates that the scanner resolution was sufficient to capture all of the detail present in the 35-mm slide.

Rhinobase: A Comprehensive Database, Facial Analysis, and Picture-Archiving Software for Rhinoplasty

Rhinoplasty is considered to be the most challenging operation in facial plastic surgery, and it is of utmost importance to document every step in detail to achieve reliable and meaningful long-term results. Using preprinted forms for documenting the data obtained during history taking and surgery is an effective and time-saving procedure. The disadvantage of this kind of documentation is the need for an additional effort in obtaining statistical results. Although facial analysis is an important prerequisite to reveal the aesthetic condition, it is a cumbersome task to accomplish.

To overcome these problems, we have developed “Rhinobase,” an innovative comprehensive software for rhinoplasty that will facilitate storage and retrieval of patient information, serve as an educational and self-assessment tool to help both novice and experienced surgeons navigate through the art and science of rhinoplasty, help make facial analysis an easy task for the surgeon, and archive the images of the patients within the database.

Methods. Rhinobase was prepared using questionnaires, previously published articles, and our experience with both rhinoplasty and computerized patient databases. Its content was prepared by all of us, and then two of us (F.A. and S.A.) developed Rhinobase using Borland Delphi software (version 4.0 for Windows; Inprise Corp, Scotts Valley, California), a popular visual application development environment. (The free, downloadable program setup files are available at http://www.rhinobase.net. Additional information about the minimum system requirements and installation procedures also can be found there.)

The main menu of the Rhinobase includes a frame for the patient's photograph; patient demographics; and shortcut buttons for clinical history, examination, photographic analysis, operative planning, operation, follow-up, and photographs (Figure 1).

The clinical history window is designed using 5 different frames: complaints, past medical history, family history, past surgical history, psychological status, and outcomes research. This module is of special importance because it provides the surgeon with clues regarding the psychological status of the patient so that the same questions are consistently asked of every patient and no questions are neglected during routine history taking.

The examination window incorporates a detailed nasal examination section that includes a dynamic nasal ex-
amination, internal valve changes, and a new classification system (septum and lateral nasal wall classification) for recording nasal airway pathologic characteristics.

The photographic analysis button brings separate windows for frontal, lateral, and basal views. Three calibrated views (frontal, right lateral, and basal with a ruler) are loaded for completing the aesthetic and photometric analyses. After the calibration is performed by means of the ruler in the picture, the landmarks are marked on the picture, and this helps Rhinobase automatically calculate the required distances and angles and display them at the bottom right of the screen (Figure 2).

The operation module consists of 7 sections; surgical notes, incisions, rhinoplasty, surgical findings, additional procedures, grafts, and graphic documentation. Specific data regarding each section can be easily entered in the fields provided or marked on the predefined graphics. Because septal surgery is of key importance in septorhinoplasty, special emphasis is given in the septum section to record in detail the data obtained during surgery. The follow-up module is used to enter data regarding the postoperative period, regular follow-up, outcomes research, and complications. The photographs module is a powerful digital image archiving and browsing module that is designed to store 6 standard rhinoplasty views. The query utility is very helpful in obtaining any kind of information within a very short time (Figure 3). It is a structured query language builder utility that is relatively simple for the end user to learn.

Rhinobase has been used for recording the data of 200 patients retrospectively and 50 patients prospectively from September 2000 to May 2008. When used prospectively,
the patient demographics and clinical history were entered directly into the computer during the first face-to-face consultation. The photographic analysis, operative planning, and addition of photographs to Rhinobase were accomplished during a second session prior to surgery. The results of the facial analysis were reviewed with the patient using the computer. The data for the operation module was entered following surgery. Additional data were added during the postoperative period. Versions 1.0 and 1.1 have been tested voluntarily by some rhinoplasty surgeons from Europe and the United States.

Results. When Rhinobase was used for 200 patients retrospectively, it was found that many of the fields in the program could not be filled properly owing to missing information in the patients’ medical charts. When the data were entered directly into Rhinobase, 3 important advantages were detected. First, there was no missing information because it was directly filled in an organized manner. Second, each session lasted 10 to 30 minutes, which was a reasonably short time for proper data collection. Third, patient information could be attained within seconds during the follow-up period, and data retrieval required only 5 to 15 minutes.

By using the query utility, any data could be retrieved from Rhinobase, which includes approximately 860 fields. The queries created can be saved for later use, the results obtained after each query can be transferred to Microsoft Excel (Redmond, Washington) for further analysis.

Comment. Facial analysis is a very important but difficult and time-consuming task that must be performed before the operation to achieve beautiful rhinoplasty results.6 Measuring the important angles and lengths on the patients’ pictures is a labor-intensive task that requires using a ruler and a protractor in the traditional way or using a computer program such as Adobe Photoshop (Adobe Systems Inc, San Jose, California). Rhinobase has a photographic analysis section that decreases the time spent for the entire facial analysis to a maximum of 10 to 15 minutes, preventing it from being a nightmare for the rhinoplasty surgeon.

There are 2 aspects of data management that are important to the facial plastic surgeon: (1) a detailed data entry and (2) organization and easy retrieval.7 One must always keep in mind that, like any filing system, the program’s efficiency is only as good as the initial data entry and consistent follow-up. In Rhinobase, almost all of the fields are designed as radio buttons and pop-up menus. This allows shorter data entry time and easier retrieval. There are about 860 fields that can be questioned by using the powerful query module of Rhinobase. Proper data entry guarantees dependable query results and valuable statistical analysis.

Rhinobase is primarily an electronic medical record system for rhinoplasty patients. The project started in November 1999. Many changes have been made, and newer versions have been created and put into use within the last 7 years. The maintenance of the program could be performed with relative ease because we were not only the users but also the programmers. Rhinobase has not been commercialized because we believe that it would be an invaluable tool for the education of rhinoplasty surgeons. The latest version has been used for more than 2 years.

In conclusion, we believe that Rhinobase, as a detailed database application, facial analysis tool, and picture-archiving utility, is an all-in-one solution for documentation of rhinoplasty patients. We anticipate that it will serve as an effective and powerful tool for both novice and experienced rhinoplasty surgeons and ultimately help optimize the long-term outcomes of rhinoplasty.

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