



B1 Experimental Analysis of the Changes in Pre- and Post-Operative Cosmetic Surgery (Rhinoplasty) by Comparison of 3D Images

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The goal of this presentation is to provide a tool based on scientific and innovative 3D reconstruction useful for an objective comparison between features of the faces in the pre- and post-operative period; in particular, the study focused on changes in the characteristics of the nose after surgery.

This presentation will impact the forensic science community by showing the usefulness of the reconstruction and analysis of 3D models pre- and post-surgery, allowing attendees to view, in an objective manner, changes of the nasal morphology.

This study first obtained the consent of the participants consisting of eight patients aged between 23 and 40 years old, who had chosen to undergo cosmetic surgery of the nose. Three acquisitions were made by the camera: on the pre-operative day, seven days, and 90 days after surgery. The stereo photogrammetric system used consists of two 3D cameras with a resolution of ten megapixels, a dual optical zoom of 3X and maximum picture resolution of 3888 x 2592. On the 3D images of the faces, landmarks were set to study the morphology of the nose (nasal, pronasal, subnasal, upper lip, left and right wing). Then the distances, indices, angles, volume, and the nasal area were calculated. This study focused on the pre- and post-operative values at 90 days; post-operative values detected a short time after surgery were not used because of the influence of inflammation of the soft tissues. Changes can be represented *qualitatively* by analyzing the color maps and *quantitatively* by numerical extrapolation of differences in measures, volume, and surface of the noses compared. Statistical analysis has also allowed assessment of how the measurements of the nose varied after a rhinoplastic surgery. This study showed that the width of the nose, the length of the nose bridge, and the height and the length of the nasal philtrum tend to vary little after rhinoplasty and thus can be taken into account for the possible recognition of a subject accused of a crime who undergoes cosmetic surgery of the nose. This comparison can be an effective tool in medical-legal cases: the professional responsibility of the plastic surgeon allows one to assess qualitatively and quantitatively the differences of the nose, frequently the subject of the claim. The comparison of 3D models pre- and post-surgery allows an objective view of the changes in nasal morphology. These data represent an important proof that the consultants can present in court on the basis that this comparison is made between 3D models perfectly aligned with each other and overlapping. The study also has an interesting application in the context of personal identification; in fact, the analysis of changes in the morphological characteristics of the face, determined by a rhinoplasty surgery, allows one to define the difference between a subject filmed before plastic surgery of the nose and a suspect that has deliberately decided to fake his or her appearance. The results of this study encourage an expansion of the search.

3D Images, Rhinoplasty, Surgery