Journal of Plastic, Reconstructive & Aesthetic Surgery (2016) 69, 848–855

JPRAS
An International Journal of Surgical Reconstruction
www.JPRASurg.com

The accuracy of different methods for diagnosing septal deviation in patients undergoing septorhinoplasty: A prospective study

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Received 28 October 2015; accepted 28 February 2016

KEYWORDS
Nasal septum;
Imaging;
Diagnostic study;
Septorhinoplasty

Summary *Objective:* This study aimed to determine the diagnostic accuracy of different diagnostic tests in predicting nasal septum deformities during preoperative planning for septorhinoplasty.
Methods: Consecutive patients who underwent septorhinoplasty between June 2011 and August 2012 were included ($n = 30$) and underwent a protocol of diagnostic tests, including nasal speculoscopy, craniofacial computed tomography (CT), three-dimensional (3D) reconstruction of the nasal septum by CT and nasal endoscopy. A modified Guyuron classification of septal deformities was used for classifying the septal deviations. Direct surgical assessment of the nasal septum during open septorhinoplasty was the reference standard with which each of the diagnostic tests was compared. Sensitivity, specificity and predictive values of each test were calculated.
Results: The preoperative diagnosis was nasal bone fracture in 11 patients, nasal septal fracture in 15 and post-traumatic nasal deformity in four. For type A deviations (localised), craniofacial CT showed the highest performance with a sensitivity of 100%, specificity of 100%, positive predictive value (PPV) of 100% and negative predictive value (NPV) of 99%. For type B septal deformations (C shape), nasal endoscopy (sensitivity, 100%; specificity, 87.5%; PPV, 87.7%; and NPV, 100%) showed the highest performance. For type C deformities (S shape), nasal endoscopy (sensitivity, 70%; specificity, 100%; PPV, 100%; and NPV, 87%) showed the highest performance. The accuracy for nasal endoscopy was 27/30 (90%), 26/30 (87%) for

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http://dx.doi.org/10.1016/j.bjps.2016.02.019

craniofacial CT, 22/30 (73%) for 3D reconstruction and 10/28 (36%) for speculoscopy.
Conclusions: Nasal endoscopy and craniofacial CT were more accurate and precise than nasal speculoscopy and 3D reconstruction for preoperative evaluation of the nasal septum, thus enabling more appropriate surgical planning for septorhinoplasty.

Introduction

Septorhinoplasty is one of the most complex and challenging surgeries in plastic surgery, even for the most skilled surgeons.[1–3] Its success requires a thorough knowledge of the nasal anatomy and function, as well as a complete understanding of the complex surgical techniques, with the aim of achieving appropriate correction of the specific problems associated with each type of deformity.[1,4,5] In this context, appropriate and rigorous preoperative planning is essential for avoiding unforeseen problems that may affect the surgical outcomes.[6–8] Assessment of the nasal septum and type of deformity is a fundamental step in preoperative planning, as they define the type of technique and the level of surgical complexity.[4,9–14]

The nasal septum not only provides structural support but is also one of the determining factors for nasal shape. In addition, its association with the lateral walls of the nose regulates intranasal flow and breathing.[13,15] Septal deviations have been associated with various levels of obstruction and alterations in nasal breathing.[16–20] Despite their pivotal role in nasal structure and function, consensus regarding the best diagnostic study to investigate septal deviations is lacking,[21,22] and many groups utilise their own protocol based on experience. Therefore, this study aimed to compare the diagnostic accuracy of different tests in predicting the actual state of the nasal septum for appropriate surgical planning.

Materials and methods

Design and patients

Consecutive patients with a suspected clinical diagnosis of nasal bone fracture, nasoseptal fracture or post-traumatic nasal deformity were included. Patients with a medical contraindication for surgery were excluded. To define the septal deformities, all patients underwent a preoperative evaluation that included a prospective protocol of diagnostic tests on consecutive days.

All patients underwent septorhinoplasty at the Division of Maxillofacial Surgery, Hospital del Trabajador de Santiago between June 2011 and August 2012 and provided written informed consent to participate in the study. The institutional review board of the Hospital del Trabajador de Santiago approved the study, which was conducted according to the standards of good clinical practice, the Declaration of Helsinki and the STARD guidelines.

Diagnostic tests

The tests included nasal speculoscopy, craniofacial computed tomography (CT), three-dimensional (3D) reconstruction of the nasal septum by CT and nasal endoscopy, which were assessed by independent observers. One surgeon performed both speculoscopy and nasal endoscopy in all patients. One radiologist performed the CT and 3D reconstruction of the nasal septum. The surgeon and radiologist were blinded to each other's results.

Nasal speculoscopy was performed using a nasal speculum to spread the nasal cavity open through the nostrils, allowing direct visualisation of the nasal septum and turbinates. Preoperative CT consisted of coronal, axial and sagittal views. Using the Brilliance Workspace Station software R4.5 2010 (Philips Medical System, Best, The Netherlands), a 3D reconstruction image of the head was obtained. After perfect symmetrical 3D image parallelisation and use of the segmentation option with the cursor in a freehand mode, all of the structures on the left and right sides of the nasal septum were erased, and a 3D reconstruction image of the nasal septum was obtained (Figure 1). Figures 2 and 3 illustrate the complete preoperative examination for two clinical cases.

To classify the septal deviation, a modified Guyuron classification of septal deformities was used[4]; the modification simplified the method and made it easier to use in daily practice. The findings were classified into three groups: type A, localised deviation; type B, C-shaped deviation; and type C, S-shaped deviation. Type A deformities included Guyuron Classes I and VI (septal tilt and localised spicule, respectively). Type B deformities included Guyuron Classes II and III (C-shaped anteroposterior and cephalocaudal septal deviations, respectively). Type C deformities included Guyuron Classes IV and V (S-shaped anteroposterior and cephalocaudal septal deviations, respectively; Figure 4). The Video in supplemental digital content 1 shows the complete preoperative examination and classification for three cases.

Supplementary video related to this article can be found at http://dx.doi.org/10.1016/j.bjps.2016.02.019.

Measurements

The preoperative findings were validated using the intraoperative anatomical findings. Direct surgical assessment of the nasal septum during open septorhinoplasty was considered the reference standard with which each of the diagnostic tests was compared; this is because after