Royal College of Surgeons
ADVANCING SURGICAL CARE

OTOLARYNGOLOGY SURGERY

Ann R Coll Surg Engl 2016; **00:** 1–2
doi 10.1308/rcsann.2015.0289

Intraoperative use of a tablet computer to aid rhinoplasty

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ABSTRACT

Open septorhinoplasty enables excellent exposure to the structural components of the nasal tip. Nevertheless, it runs the risk of weakening its support mechanisms, which can lead to notable changes to tip projection and rotation as well as to the nasolabial angle. It is therefore paramount that the surgeon reconstructs the nose correctly at the desired endpoint.

Currently, the gold standard of care in rhinoplasty uses preoperative photographs with the patient sitting or standing. However, this is not a true representation of the face in the operative position as the patient is placed supine and so gravity affects the appearance of the nose in a different way. Other factors such as head drapes and traction on the endotracheal tube can also cause subtle changes. We therefore advocate additional intraoperative profile view photographs to improve the accuracy of the positioning of the nasal tip.

In our department, in addition to standard preoperative photographs, immediate preoperative profile photos are taken with the patient supine, intubated and draped. Images are captured using a tablet computer at a distance of 1 meter from the patient. We ensure that the Frankfort plane is perpendicular to the floor. The picture is enlarged so that the image is full scale and the tablet is subsequently placed immediately behind the patient for direct comparison. This is then used during the procedure to check tip projection and rotation as well as at the end of the procedure following closure of the columellar incision to ensure correct placement of the nasal tip.

KEYWORDS

Rhinoplasty – Photographs – Tablet computer

Accepted 29 February 2016

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Septorhinoplasty is a functional and cosmetic procedure. A significant number of septorhinoplasties are performed in the UK every year, predominately by ear, nose and throat surgeons.[1] Open septorhinoplasty is preferred by many surgeons because it enables direct inspection of the anatomy of the nose, controlled modelling, bimanual handling, graft fixation and protection of the nasal valve.[2,3] Indications for open septorhinoplasty include complex nasal tip surgery, revision rhinoplasty, rhinoplasty requiring complex structural grafting, trauma, tumour, septal reconstruction and congenital malformations.[2,4]

In order to gain access to the septum, the lower lateral cartilages are separated and reconstituted at the end of the procedure to remake the unified tip. This approach leads to disruption of many of the supportive mechanisms of the tip and consequently, to significant changes to tip projection and rotation as well as to the nasolabial angle. These changes can be either intentional or inadvertent. It is therefore paramount that the surgeon reconstructs the nose correctly at the desired endpoint.

Preoperative photographs are generally taken with the patient sitting or standing. The profile view is the most important picture for the assessment of tip rotation, projection and the nasolabial angle. However, this image cannot accurately represent the face intraoperatively as the patient is in a supine position and so gravity affects the appearance of the nose in a different way.

As a result, we advocate taking an additional intraoperative profile photograph in the surgical position at the start of the procedure following draping. The aim of this is to eliminate many of the changes induced by the supine position, enabling a more accurate direct comparison of the pre and postoperative views at the end of the case. We find using a tablet computer ideal as the image can be enlarged so that the photograph of the patient is the same size as the patient, which further helps with accurate tip position.

Technical description

We use a departmental tablet computer (iPad® [Apple, Cupertino, CA, US], 9.7" screen, 1,024 x 768 pixel resolution at

132ppi, VGA quality camera with 5x digital zoom) to take the intraoperative profile photograph at a distance of 1 meter from the patient. In order to guarantee proper positioning of the patient, we ensure that the Frankfort plane (an imaginary line extending from the upper margin of the external auditory canal to the inferior border of the infraorbital rim)[5] is perpendicular to the floor. Furthermore, the tip of the nose should lie in the midsagittal plane to prevent head rotation.

The picture is enlarged so that the image is full scale and the tablet is subsequently placed immediately behind the patient for direct comparison. This is referred to during the procedure to check specific landmarks of the nose in the profile view, such as the nasofrontal angle, the nasolabial angle, and the nasal tip projection and rotation. The picture is also used when performing a final check of these facial landmarks at the end of the operation following closure of the columellar incision, prior to applying the nasal dressing.

Discussion

Open septorhinoplasty gives direct access to the nasal cartilaginous and bony skeleton. This enables the surgeon to assess the anatomical deficits in situ and operate with more precision, leading to more satisfactory and predictable results. Nevertheless, it runs the risk of weakening the support mechanisms of the nasal tip, which can result in notable changes to tip projection and rotation as well as to the nasolabial angle. At the end of the operation, it is important to restore support of the tip by suturing the medial crura back together with the use of a columella strut or by attaching them to the caudal septum (tongue-in-groove technique). However, in doing so, one can intentionally or unintentionally change these highly important facial landmarks.[5] For this reason, intraoperative comparison with preoperative findings is indispensable. In addition to quality assurance, medical photography is also essential for medicolegal protection of surgeons undertaking rhinoplasty.[6]

Currently, the gold standard of pre and postoperative photographic documentation of septorhinoplasty includes several photographs with a neutral background, with the patient sitting or standing:

> frontal view
> lateral view (bilateral)
> oblique view (bilateral)
> basal view
> smiling lateral view[7]

However, these pictures are not representative of the surgeon's intraoperative view of the patient's face. We have sometimes found it difficult to 'translate' the preoperative erect photographic images to the intraoperative supine view, particularly with profile views. This happens because measurements used to describe the nose in the profile view may be distorted intraoperatively as facial landmarks undergo subtle changes in the supine position owing to gravity.[8] Furthermore, other factors such as head drapes and traction on the endotracheal tube can lead to subtle changes in the appearance of the nose in the profile view, potentially misleading the surgeon. This is unfortunate as septorhinoplasty requires millimetre accuracy. A discrepancy of even 2mm in tip rotation can make the difference between an acceptable result and one that requires revision.

Figure 1 Postoperative photograph taken with a tablet computer with the image enlarged to full scale

In order to reduce this potential for intraoperative surgical error, an intraoperative profile photograph is taken at the start of the case, with the patient supine, intubated and draped (just prior to the first incision). The intraoperative supine profile photograph on the tablet can then be placed directly behind the patient at any stage of the operation to allow direct intraoperative comparison (Fig 1). This comparison is further facilitated by software available for most tablets, which makes it easy to enlarge the picture so that the image is the same size as the patient. Using this technique, the changes induced from surgery in tip projection, rotation and dorsal profile are easily apparent even to the unskilled eye.

Conclusions

In our opinion, the technique described above is a helpful tool in simplifying the sometimes complex task of setting the nasal tip in the desired position at completion of the operation. Based on our experience, this technique results in improved aesthetic outcomes and satisfaction for both patients and surgeons.

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