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Nuances in component nasal hump reduction

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Summary *Importance:* Nasal hump reduction is a frequent manoeuvre in rhinoplasty. Over the last years, composite hump reduction has been advocated in favour of component hump reduction. The latter allows a more controlled and stepwise approach in reducing the nasal dorsum by deprojecting the cartilaginous dorsum separately from the bony dorsum. This approach also preserves the upper lateral cartilages (ULCs) and their mucosa.
Objective: To analyse the intricacies of the anatomic transition zone between the ULCs, the rhinion and the nasal bones as they pertain to component hump reduction.
Method: Anatomical dissections with five fresh cadaveric heads were performed in this study. The cephalic extension of the ULCs beneath the nasal bones was modified and measured after component hump reduction on both sides of the rhinion.
Results: Central detachment of the ULCs from the bony dorsum and their release from the medial undersurface of the nasal bones allows for complete preservation of the ULCs. This is achieved by inferior-medial rotation of the cephalic ends of the ULCs against the septum. If not released completely during hump reduction, a substantial loss of the ULCs may be the consequence.
Conclusions: The described manoeuvre allows the preservation of the cephalic components of the ULCs underneath the bony dorsum during component hump reduction. The result is a smoother transition line at the keystone area and along the entire bony-cartilaginous dorsum with a straighter aesthetic dorsal profile and oblique view. The present findings allowed us to present an operative algorithm with implementation into clinical practice.

Parts of this study were presented at the Annual Meeting of the European Academy of Facial Plastic and Reconstructive Surgery in September 2016 in London, UK.
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Introduction

In many rhinoplasty procedures, reduction of the osseocartilaginous hump becomes an essential step during surgery. The anatomy of this region is complex, with many anatomical structures represented. Hump reduction, particularly if osteotomies are also performed, causes significant disruption that needs reconstruction. Possible sequelae include dorsal irregularities, inverted-V deformities or excessive narrowing of the middle vault. Anatomically, the bony vault is composed of the nasal bones. They attach superiorly to the frontal bone and laterally to the nasal process of the maxilla. Their inferior portion attaches to and overlaps the cephalic border of the upper lateral cartilages (ULCs).[1] This is an important aspect the authors will reflect on later in more detail.

The middle vault area consists of both the ULCs laterally and the septum medially. It provides a larger contribution to the dorsal hump than the paired nasal bones. The keystone area (K-area) marks the skeletal surface transition from the osseous to the cartilaginous dorsum. This specific area is characterised by its T-shaped contour and represents the widest part of the nasal dorsum. The ULCs join with the septum and form a 'unified cartilaginous arch', a term that has been coined by Rollin Daniel.[2,3]

Another anatomic key-point is the fact that the ULCs extend cranially beyond the K-area along the undersurface of the nasal bones.[1,4,5] This underlap can vary between 4 and 14 mm in length and 3 and 9 mm in width.[6] This anatomic peculiarity has an important impact on the stability of the bony vault and surgical interventions such as component hump reduction.

Component hump reduction is nowadays the gold standard in nasal hump reduction. It has displaced composite hump reduction over the past few years and addresses the bony and the cartilaginous dorsum individually.[7–9] This technique allows deprojection of the nasal hump in a more controlled and step-wise fashion. It describes the detachment of the ULCs from the septum at the cartilaginous dorsum before the septum is reduced. Bone reduction can be performed before or after this step. As a consequence, the horizontal component of each ULC is preserved. This facilitates maintenance of strength, stability, and width of the middle vault. The risk of a middle vault collapse or an inverted-V-deformity and the routine use of spreader grafts is minimised. This important aspect reflects the outstanding role in preserving the ULCs during hump reduction.[10–12]

Interestingly, many studies address the effect component hump reduction has on the cartilaginous dorsum in the middle vault area.[13] The authors see the need to emphasise subtle nuances in component hump reduction that are not specifically addressed in the literature. These pertain especially to the relationship of the ULCs to the bony dorsum at the rhinion, namely the dorsal and lateral K-areas. The fact that a significant underlap of the ULCs under the nasal bones exists has not received widespread attention. The bony dorsum is a cap over the cartilaginous dorsum. The purpose of the present study was to analyse the transition of the ULCs to the bony dorsum and the septum during component hump reduction. The authors introduce an algorithm for reconstitution of the bony-cartilaginous dorsum with refinements in component hump reduction.

Materials and method

The present study was performed at the Division of Facial Plastic Surgery, Department of Otolaryngology, University Hospital of Mannheim and the Department of Anatomy, University of Regensburg, Germany. Data analysis and production of the manuscript was completed at the Division of Facial Plastic Surgery, Department of Otolaryngology, University Hospital of Mannheim, the Finesse Center for Facial Plastic Surgery in Regensburg, Germany, and the Nose Clinic, Guilford/London, UK. The study encompasses a human cadaver study on five fresh frozen cadaver heads with implementation of the anatomical findings into surgical practice. The authors describe a more detailed surgical algorithm in component hump reduction.

Anatomical study on human cadaver heads

A total of five fresh frozen cadaver heads were used. Dissections were performed using headlight illumination and loupe magnification with standard instruments. Key findings and standardised surgical manoeuvres were documented using macrophotography with a Nikon D90 camera (Nikon Inc, Melville, New York), Sigma 17–70 mm, 1:2.8 Macro lens (Sigma Inc, Ronkonkoma, New York) and Sigma EM 140 iTTL macro ring light (Sigma Inc, Ronkonkoma, New York). The camera setting was as follows: aperture F18, shutter speed 1/60 s, ISO 200, white balance flash, manual focus and 70 mm focal length. All photographs were taken in the axial plane at an angle of 45° to the Frankfurt horizontal plane from below.

Steps of dissection

In all specimens, a midline incision was performed from the glabella to the nasal tip. The incision was carried along the columella and ended in the philtrum of the upper lip. The skin and soft tissue envelope was raised and dissected off the nose in the supraperichondrial plane on the cartilaginous dorsum and the subperiosteal plane on the bony dorsum to expose the underlying bony and cartilaginous structures. The ULCs and the adjacent septal cartilage were separated from the lower lateral cartilages (LLCs) by extending the intercartilaginious incisions into a transfixion incision. This exposed the inferior border of the ULCs and the septum. The underlying mucosa was then released from both the ULCs. In each cadaver head specimen, the bony-cartilaginous hump was marked as a dotted line with a skin marker. The anterior border of the nasal bones was marked at the K-area using a 27-Gauge needle. Both the ULCs were then released from the septum in the subperichondrial plane, leaving a 1-mm gap between the ULCs and the septum (Figure 1a-b).

From here on, the ULCs on both sides of the rhinion were dissected differently before performing component hump reduction. In all five cadaveric heads on each left side, the ULC was left attached to the nasal bone. On each right side, the medial aspect of the ULC was disarticulated from the