Aesth Plast Surg
https://doi.org/10.1007/s00266-024-03997-0

The "Keystone Angle": Geometry in Preservation Rhinoplasty

Gisella Nele[1] · **Annachiara Cavaliere**[2] · **Fabrizio Schonauer**[2]

Received: 1 March 2024 / Accepted: 4 March 2024

Abstract
Rhinoplasty outcome may depend on different factors and bony dorsum shape has proven to significantly influence the lateral view result. The "Keystone angle" corresponds to the osseocartilaginous angle formed between bony and cartilaginous dorsum. Usually, the "V" shaped bony dorsum is characterized by a more acute "Keystone angle" compared to the "S" shaped bony dorsum. To achieve the ideal dorsum flatness, corresponding to a "Keystone angle" of 180°, different techniques may be used. Bearing these concepts in mind we suggest that preoperative assessment of the "Keystone angle" can guide the choice of the most appropriate technique for each patient.
Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Rhinoplasty · Preservation rhinoplasty cartilaginous preservation rhinoplasty · Structural rhinoplasty · Nasal bony dorsum

Dear sir,

We read with great interest the recently published article by Guyuron et al. "Common Dorsal Flaws Following Preservation Rhinoplasty: A Systemic Analysis". [1] As pointed out by the authors, despite great outcomes can be achieved with preservation rhinoplasty, dorsal irregularities, dorsal deviation, and residual humps may compromise the final result. Recently, great importance has been given to preoperative bony dorsum shape and its influence on lateral view result. [2, 3] Bony dorsum may be defined as "V" shaped or "S" shaped. While the "S" shaped bony dorsum appears to be nearly flat, the "V" shaped bony dorsum has a peak, defined as "kyphion", between the *nasion* and the *rhinion*. [4]

Bearing these concepts in mind, we would like to define a new important anatomical angle and its role in preservation rhinoplasty. The "Keystone angle" corresponds to the osseocartilaginous angle formed between bony and cartilaginous dorsum. Usually, the "V" shaped bony dorsum is characterized by a more acute "Keystone angle" compared to the "S" shaped bony dorsum.

According to the ideal nose shape, the "Keystone angle" should measure 180°, which means a flat nasal dorsum. (Figs. 1, 2) Clearly, to achieve this ideal dorsum flatness with osseocartilaginous preservation rhinoplasty, the more acute the "Keystone angle" is, the wider range of motion is needed in correspondence of the osseocartilaginous joint in the keystone area.

The "Keystone angle" was measured using the Computer Tomography images in 112 consecutive patients undergoing osseocartilaginous preservation rhinoplasty. "Keystone angle" width ranged between 173° and 149°, with a mean value of 160°.

✉ Annachiara Cavaliere
annachiaracavaliere@yahoo.it

Gisella Nele
gisenele@gmail.com

Fabrizio Schonauer
fschona@libero.it

[1] Gisella Nele Body and Mind Center", Naples, Italy

[2] Unit of Plastic Surgery, University "Federico II", Via Sergio Pansini, 5, 80131 Naples, Italy

Published online: 15 March 2024

Fig. 1 **a** preoperative condition, "S" shaped nasal dorsum predominantly made of cartilage with a "Keystone angle" > 150°, **b** postoperative result with an ideal "Keystone angle" of 180°

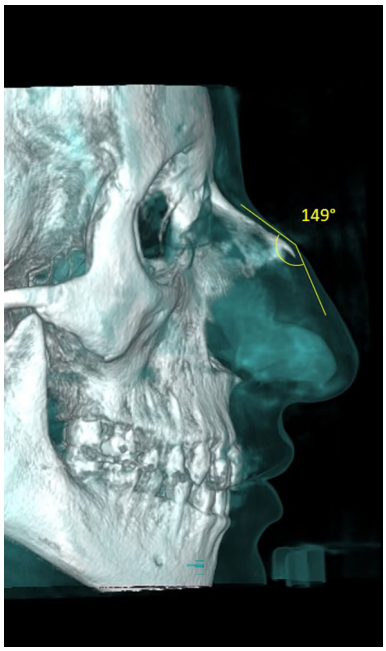

Fig. 2 3D Computer Tomography image of a "V" shaped bony dorsum with a "Keystone angle" of 149°

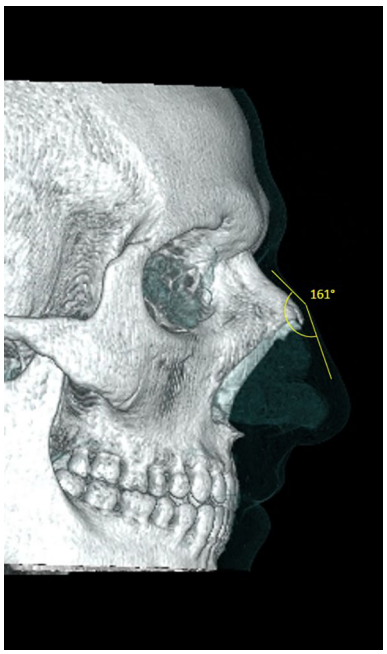

Fig. 3 3D Computer Tomography image of a "S" shaped bony dorsum with a "Keystone angle" of 161°

Different maneuvers were performed to widen the "Keystone angle". In patients with a "Keystone angle" width >150°, the "Ballerina Maneuver" described by Goksel et al. was used [5]. In patients where the dorsum was predominantly made of bone and with a "Keystone angle" width < 150°, the range of motion achievable at the osseocartilaginous joint was limited with this maneuver. This condition is usually associated to a NR (Nasion-Rhinion)/N-ASA (Nasion-Anterior Septal Angle) ratio greater than 0,50. (Fig. 3) In these patients, cartilaginous preservation rhinoplasty or structured rhinoplasty were preferred. [6]

Preoperative CT scan should always be included in preoperative evaluation for all patients undergoing rhinoplasty, especially when preservation rhinoplasty is planned. Bony dorsum shape and "Keystone angle" should be carefully assessed and considered to guide the choice of the most suitable technique for each patient and improve the final result (Fig. 4).

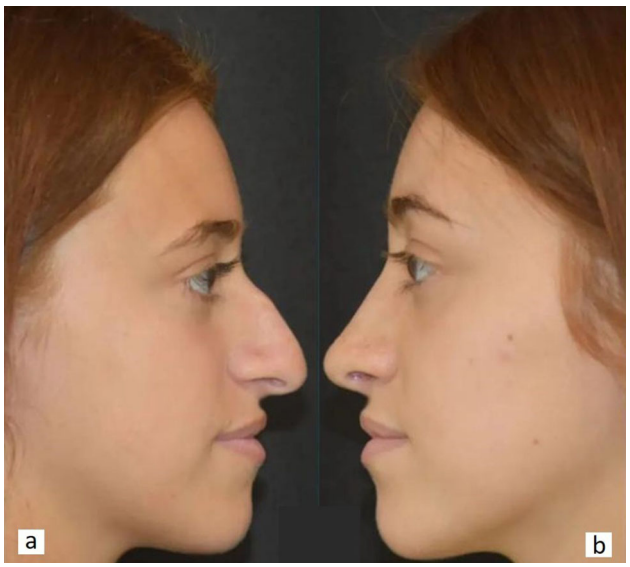

Fig. 4 **a** preoperative condition, nasal dorsum predominantly made of bone with a "Keystone angle" < 150°, **b** postoperative result after cartilaginous preservation rhinoplasty.

Acknowledgements The authors declare that they have no conflict of interest.

Declarations

Conflict of interest The authors declare that they have no conflicts of interest to disclose

Ethical Approval Ethical approval was not required

Informed Consent Written informed consent for photo publication was obtained by the patient.

References

1. Guyuron B, Wells MW, Chang IA et al (2023) Common dorsal flaws following preservation rhinoplasty: a systemic analysis. Aesth Plast Surg 47:1494–1498. https://doi.org/10.1007/s00266-023-03437-5
2. Saban Y, de Salvador S (2021) Guidelines for dorsum preservation in primary rhinoplasty. Facial Plast Surg 37(1):53–64. https://doi.org/10.1055/s-0041-1723827. (**Epub 2021 Feb 25 PMID: 33634452**)
3. Kosins AM (2021) Incorporating dorsal preservation rhinoplasty into your practice. Facial Plast Surg Clin North Am 29(1):101–111. https://doi.org/10.1016/j.fsc.2020.09.001. (**PMID: 33220835**)
4. Lazovic GD, Daniel RK, Janosevic LB, Kosanovic RM, Colic MM, Kosins AM (2015) Rhinoplasty: the nasal bones—anatomy and analysis. Aesthet Surg J 35(3):255–263. https://doi.org/10.1093/asj/sju050. (**PMID: 25805278**)
5. Goksel A, Saban Y, Tran KN (2021) Biomechanical nasal anatomy applied to open preservation rhinoplasty. Facial Plast Surg 37(1):12–21
6. Gonçalves Ferreira M, Ishida LC, Ishida LH, Santos M (2022) Ferreira-Ishida technique: spare roof technique B. Step-by-step guide to preserving the bony cap while dehumping. Plast Reconstr Surg 149(5):901e-904e. https://doi.org/10.1097/PRS.0000000000009060. Epub 2022 Apr 26. PMID: 35472049.