Surgery of the External Nose (Rhinoplasty)

Preliminary Remarks

Surgery of the external nasal pyramid is undertaken for aesthetic reasons (e.g., a prominent hump) or for combined functional and aesthetic reasons (e.g., tension nose, crooked nose, saddle-nose deformity). The term "aesthetic surgery" relates to the normalization of an external deformity, while "cosmetic surgery" addresses the improvement of an otherwise normal form. In general, however, a clear line is not drawn between these two terms.

The form and function of the nose must be considered as a single entity. A deformity is usually associated with a disturbance of function. "Functional and aesthetic surgery of the nose," therefore, has the aim of reconstructing this entity. Earlier in this chapter, reference has already been made to the significance of the nasal septum (see **Fig. 6.12**). Functional and aesthetic surgery of the nose usually involves a combined operation on the nasal septum and the external nose (septo-rhinoplasty). Although they are discussed separately in this surgical textbook, they are generally operated on in one session, with the operation typically proceeding along the following steps:

- Septoplasty part 1: incision, approach, mobilization and resection, temporary nasal pack.
- Rhinoplasty with incision, approach, correction.
- Septoplasty part 2: replacement, reconstruction, fixation, suture repair of the incisions.
- Definitive nasal pack, external dressing, splint.

Although the two operative components are usually, and wisely, performed together, there is also a major problem in septo-rhinoplasty: Unlike an operation purely on the external nose (rhinoplasty), which is performed around an unaffected septum as the central support, the simultaneous correction of the nasal septum, together with the mobilization and reconstruction involved, results in dynamic healing processes that over the course of weeks and months may be associated with changes of the position of the septum, recognizable by changes in its outer form. The late results of the external form may therefore differ considerably from the immediate postoperative outcome, making any reliable prognosis difficult. Revision surgery may therefore be necessary and is sometimes unavoidable, despite the most careful of surgical techniques. Patients should be made particularly aware of these special circumstances when the informed consent is discussed, and the potential need for later refinements, which should not be performed until a year after the initial operation, should be specifically mentioned.

Given that septo-rhinoplasty serves the reconstruction of both form and function, purely aesthetic or cosmetic operations should not be undertaken at the expense of function. Such operations often involve resections of the cartilaginous infrastructure of the external nose to achieve reductions or narrowings, and this can easily result in a loss of the supportive function, even after a period of years. Surgery in these cases becomes a trade-off between improvement of the external form and disturbance of function.

Basic Techniques

Incisions and Approaches to the Nasal Dorsum

Endonasal Approaches

Surgical Principle

The endonasal *incision* is always made in the skin of the vestibule, not in the mucosa. *Access* to the nasal dorsum is achieved by elevation of the soft-tissue envelope (**Fig. 6.31b**) *over* the perichondrium and *beneath* the periosteum (so-called degloving or décollement).

Indications

Operations to the nasal dorsum, such as osteotomies or nasal hump reduction.

Contraindications

Necrosis may develop with very atrophic skin due to severe scarring secondary to trauma or multiple previous operations.

Specific Points Regarding Informed Consent

Irregularities after surgery of the nasal dorsum are not always avoidable, especially with very thin nasal skin. Refinements may be necessary, but should not be undertaken earlier than 6 months after the initial operation. Skin atrophy (particularly after revision surgery) may result in erythema and teleangiectasia of the skin of the nasal dorsum (rubeosis). Sensory disturbances of the skin, in rare cases even chronic pain, may result from the (unavoidable) division of nerves (**Fig. 6.31a**).

Operative Planning

The choice of endonasal incisions depends, among other things, on whether simultaneous operations on the lower lateral cartilages are intended. Reduction of volume in the region of the lateral crus will require a transcartilaginous incision rather than an intercartilaginous approach (see **Fig. 6.59**). An external approach (see below) is recommended for more complex surgery of the nasal tip.

Special Instruments (see also Fig. 6.6)

A scalpel with a No. 15 blade is suitable for the incisions. A sharp, double-pronged retractor (e.g., a ring retractor) is used to expose the nasal vestibule. Degloving is achieved either with a scalpel or with slightly angulated pointed scissors to expose the perichondrium in the correct plane. A slightly curved (McKenty) elevator is used for subperiosteal tunnelling in the K-area. A sufficiently wide Aufricht retractor will allow direct vision of the cartilage and bone of the nasal dorsum.

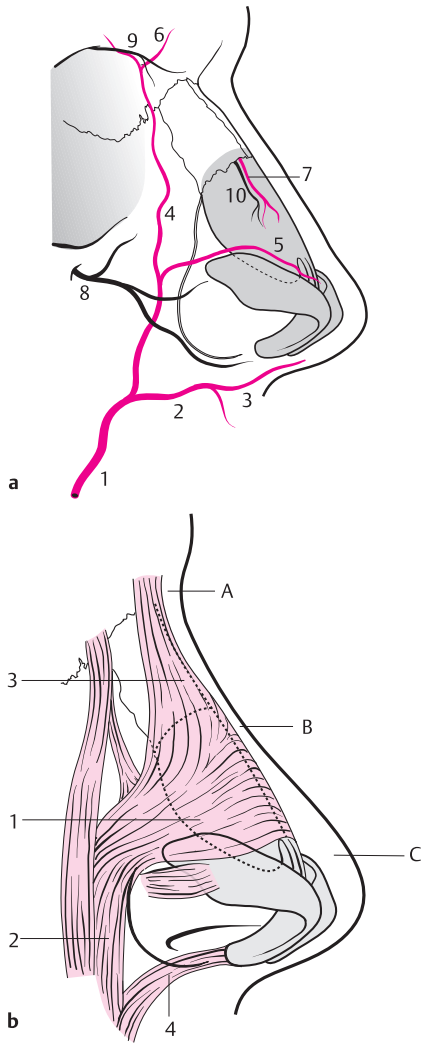

Fig. 6.31a, b Soft tissues, vessels, and nerves of the external nose.
a Neural and vascular supply.
Arteries (red):
1 facial artery (from the external carotid artery)
2 superior labial artery
3 terminal branch between the medial crura of the lower lateral cartilages
4 angular artery
5 superior alar artery (between the upper and lower lateral cartilages)
6 supratrochlear artery (from the internal carotid artery)
7 anterior ethmoid artery (from the internal carotid artery); exit point between the nasal bone and the upper lateral cartilage
Nerves (black):
8 infraorbital artery
9 supra- and infratrochlear nerves
10 external branch of the anterior ethmoid nerve
b Thickness of the skin and superficial musculoaponeurotic system (SMAS). Various thicknesses of the skin (arrows): thick at the root of the nose (A) and supratip region (C), thin over the keystone area (B).
External nasal muscles:
1 *Name:* pars transversa; *origin:* maxilla; *attachment:* nasal dorsum
2 *Name:* pars alaris; *origin:* incisive fossa; *attachment:* skin, nasal alae
3 *Name:* procerus muscle; *origin:* division from frontal muscle; *attachment:* periosteum, nasal dorsum
4 *Name:* depressor septi muscle; *origin:* incisive fossa; *attachment:* medial crus

Surgical Technique (Fig. 6.32)

Incisions made exclusively on one side (hemitransfixion and intercartilaginous incision) are sufficient for minor operations on the nasal dorsum (e.g., for smoothing out irregularities). Better visualization is achieved, however, by extensive separation of the lower lateral cartilages from the rest of the pyramid. For this purpose a transfixion incision is made to divide the skin of the membranous septum *anterior* to the caudal septal margin, reaching from the level of the upper lateral cartilages to about the level of the anterior nasal spine. Bilateral intercartilaginous incisions are made between the cephalic margin of the lower lateral cartilages and the caudal margin of the upper lateral cartilages, at the lowest point of the cutaneous indentation between both cartilages (the so-called cul-de-sac: see **Fig. 6.3a**) and should preferably meet the transfixion incision at right angles, because at the end of the operation the connecting point of these two incisions must be identified precisely and re-approximated exactly. Such incisions, with an almost semicircular course, otherwise tend to heal with a circular contraction and subsequent deformation of the nasal valve after improper, or even omitted, suture repair.

The upper lateral cartilages are identified with spreading movements of the tips of pointed scissors over the anterior–inferior corner to expose the perichondrium in the region of the nasal dorsum. The soft-tissue envelope can now be elevated in this plane under direct vision, with the SMAS lying immediately over the Aufricht retractor. Once the K-area has been reached (which is best confirmed by palpation), the periosteum is then incised transversely at this point and elevated with the curved elevator as far as the nasal root. Subperiosteal dissection at the nasal root is used to elevate the procerus muscle from the bone. This considerably facilitates extraction of a mobilized osseocartilaginous nasal hump because the muscle fibers have already been detached.

Lateral undermining of the nasal dorsum should only be performed as far as the reduction of a nasal hump, for example, requires.

Rules, Tips, and Tricks
If the volume of the of the lower lateral cartilages is intended to be reduced by trimming off a cephalic strip of cartilage, then a

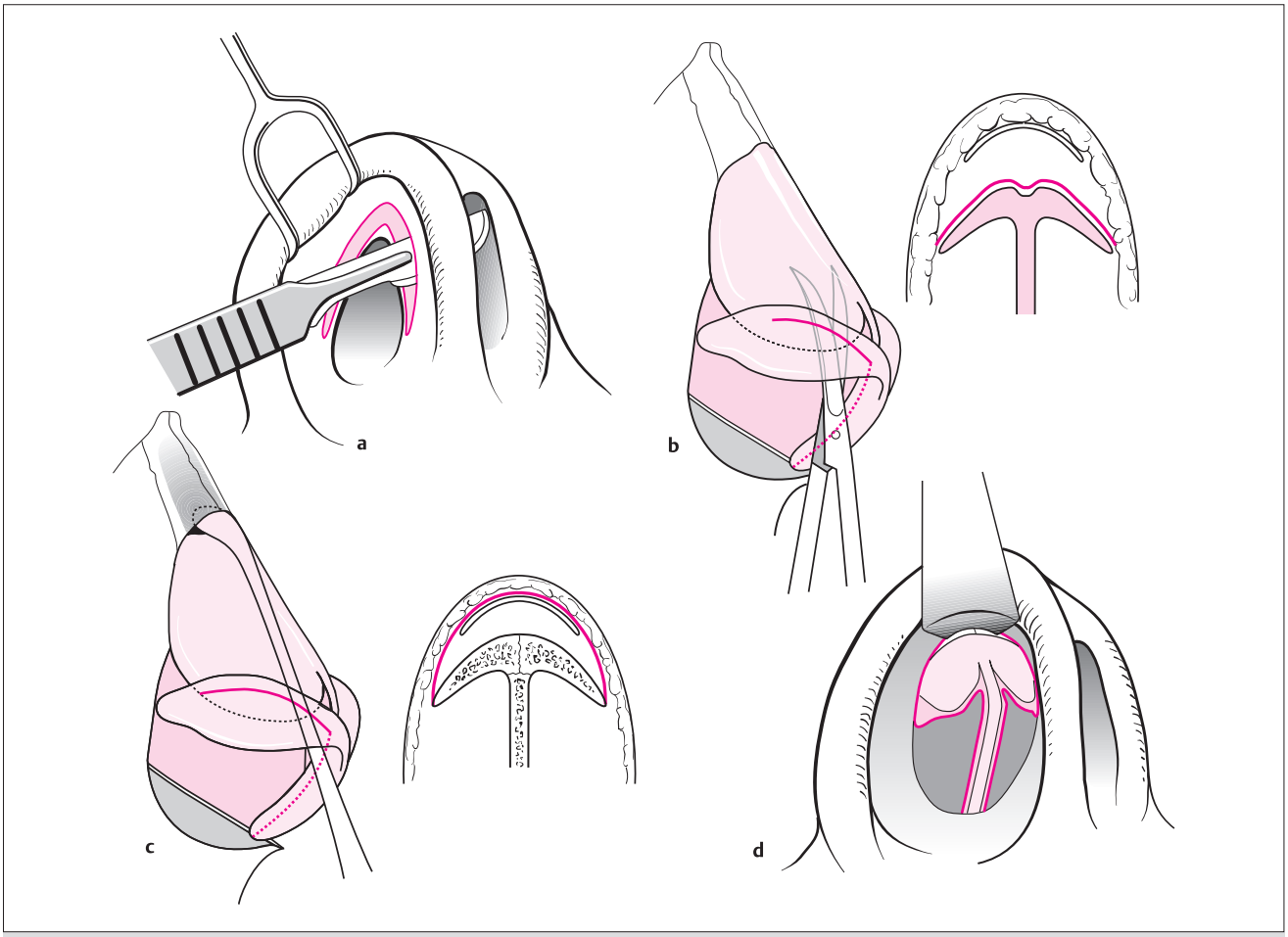

Fig. 6.32a–d Endonasal approach to the nasal dorsum.
a Intercartilaginous incisions (between upper and lower lateral cartilages) on either side and transfixion (in the membranous septum between the lower lateral cartilages and the caudal edge of the septum).
b Elevation of the skin over the nasal dorsum (degloving) close to the perichondrium (red) using angulated pointed scissors; the transverse section shows the skin held up with an Aufricht retractor.
c On reaching the keystone area, the plane of dissection changes from the epiperichondrial to the subperiosteal; the periosteum (red) has been released together with the skin by a McKenty elevator and raised.
d Exposure of the nasal dorsum with the Aufricht retractor; the procerus muscle has also been elevated together with the periosteum and the bony root of the nose has been exposed.

transcartilaginous incision should be selected instead of an intercartilaginous incision (see **Fig. 6.59**). Direct undermining of the nasal skin with a scalpel (No. 15 blade) without direct vision is also possible, although the plane of dissection does not then usually lie immediately over the perichondrium, but rather more superficially. With significantly "retroussé" upper lateral cartilages, it may be difficult to identify the caudal lateral area of the upper lateral cartilages in the correct plane. In this case it is best to identify the junction between the cephalic margin of the lower lateral cartilage and the caudal margin of the upper lateral cartilage, followed by the conservative excision of the raised free edge of the upper lateral cartilage. The cut edge of the cartilage may then be deflected toward the nasal cavity and the perichondrial plane can subsequently be identified.

External Approach

Surgical Principle

The skin is elevated off the columella, nasal tip, and nasal dorsum after making an incision at the columella and extending it in an endonasal direction along the caudal margin of the lower lateral cartilage. This allows corrections under direct vision, which is a particular advantage when preserving or restoring symmetry.

Indications

Simultaneous operations on the nasal tip and pyramid, especially for more complex deformities and revision surgery. There is also good visualization of the nasal septum, which is advantageous when undertaking technically more demanding reconstructions with grafts and closing a septal perforation.

Contraindications

Severely scarred columella with the risk of skin necrosis. Increase of nasal tip projection in case of a short columella due to the associated risk of wound breakdown from suturing under tension.

Specific Points Regarding Informed Consent

Information regarding the possibility of wound breakdown and visible scar formation. Long-lasting (≥1 year) sensory disturbances in the area of the columella and more significant swelling, particularly of the supratip region.

Surgical Technique (Figs. 6.33 and 6.34)

The columellar incision should be barely visible later, if the orginal incision and suture technique have been sufficiently precise.

An incision in the form of an inverted V has proved useful for the columellar incision (**Fig. 6.33**). The tip of the inverted V is at the level of the narrowest part of the columella (usually the junction between the lower third and the upper two thirds). The lateral points are over the wider basal part of the columella, slightly medial to the junction with the membranous septum. The inverted V formed in this manner has the advantage of being relatively wide at its base, with the lateral corner points still situated in the anterior surface of the columella. This makes it easier to avoid creating a step-off at the junction with the horizontal incisions at the membranous septum. Any irregularity in this area gives the optical impression of a permanent "dewdrop." The V-shaped incision is best made with a No. 11 scalpel blade, as this allows the exact creation of the sharp angle. Injury to the medial crus of the lower lateral cartilage need not be feared with this incision, because only fibrous tissue and possibly a minor blood vessel are to be found beneath the skin here (**Fig. 6.31a**). The vessel may bleed most annoyingly, however, and interfere with further surgery, in which case it should be cauterized with fine bipolar diathermy forceps.

The further incisions are done with a No. 15 scalpel blade. The transverse incision of the skin over the medial crura of the lower lateral cartilages, with its connection to the incision already made, must be done very carefully because the cartilage lies immediately beneath the skin and is often very thin. There is no protective subcutaneous layer of fatty tissue at this point. The further incision is endonasal, running initially at right angles toward the nasal tip, and is also superficial because of the thin skin coverage. In the region of the domes of the lower lateral cartilages, the so-called soft triangle ("facet area") should be protected. The soft triangle is a cartilage-free area of skin at the anterior margin of the nostril. Here, the endonasal incision must directly follow the caudal margin of the lower lateral cartilage. If the incision comes to lie too near to the nostril margin on the inside, the latter may become distorted by the scars—aesthetically an extremely undesirable outcome, which is almost impossible to repair. The incision ends about 5–10 mm lateral to the dome. In special cases, when a more extensive exposure is required, it may also be extended further.

Elevation of the thin skin from the medial crura of the lower lateral cartilages is problematic. Undermining the skin over the cartilage with fine pointed scissors is the best method of protecting the cartilage. The small bridge of tissue that sub-

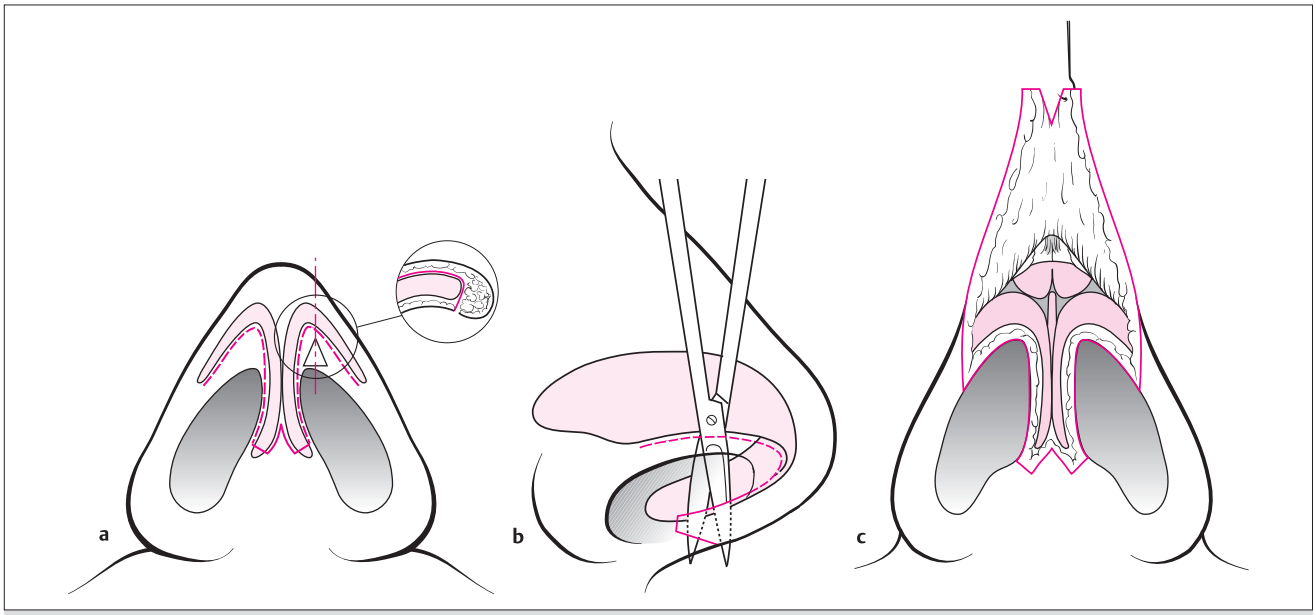

Fig. 6.33a–c External approach to the nasal dorsum and nasal base.
a Angulated columellar incision (continuous line) and marginal incision (dotted line because it is hidden). Protection of the "soft triangle" (inset with cross-section): the cutaneous fold along the upper margin of the nostril must be especially protected during the incision.
b Detachment of the columellar skin off the lower lateral cartilages with pointed scissors.
c Exposure of the lower lateral cartilages and the nasal dorsum after degloving.

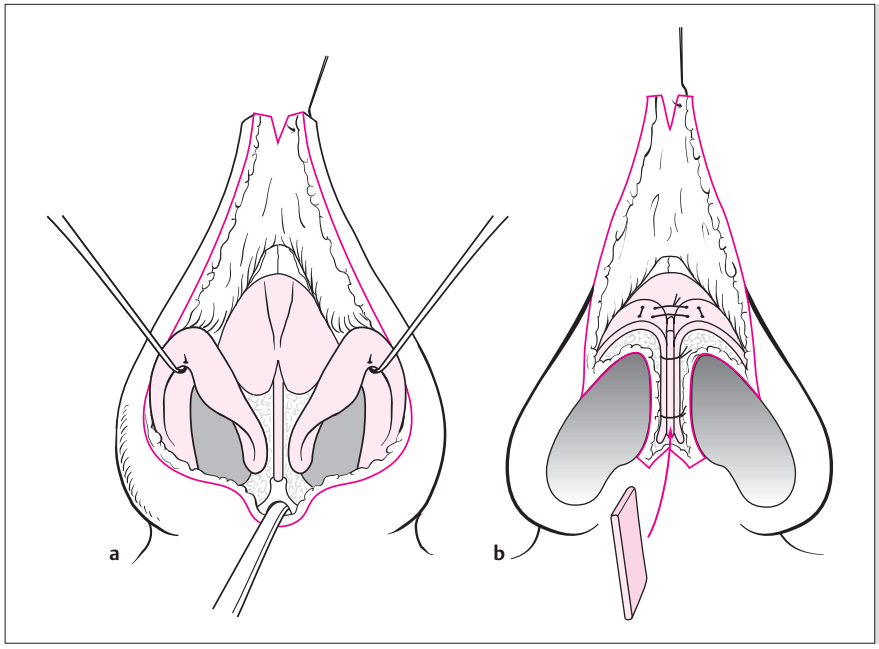

Fig. 6.34a, b External approach to the septum with subsequent reconstruction.
a Separation of the medial crura and domes of the lower lateral cartilages.
b Stabilization of the nasal tip with a columellar strut after an external approach. Interdomal suture.

sequently remains at the caudal incision margin may then be easily divided with a cut of the scissors. Once the cartilage has been exposed, further detachment of the columellar skin is usually unproblematic and best done with small angled scissors. Dissection of the dome region may still be critical, but should not usually pose any major difficulties if the caudal margin of the lower lateral cartilage is followed consistently and scissors are used to divide the skin of the vestibulum. While these steps are undertaken, the columella should be held with a sharp skin hook and not with forceps. After the domes of the lower lateral cartilages are exposed (while preserving the perichondrium), the cartilaginous nasal dorsum is identified using spreading movements of the scissors. The nasal dorsum is further exposed as in the endonasal approach. When doing so, any dissection that extends too far laterally between the lower and upper lateral cartilages should be avoided, as visibility may be lost due to bleeding from an artery that runs in this area (**Fig. 6.31a**).

The external approach also allows the opportunity of exposing the septum to view (**Fig. 6.34**). For this purpose, the fibrous tissue between the medial crura is first divided with scissors until access is gained in front of the nasal spine via the avascular gliding plane to the muscles of the upper lip (the so-called "magic plane"). After dividing the fibrous anchorage of the domes of both lower lateral cartilages, the latter can be displaced laterally with single hooks to allow the caudal septal margin and the upper lateral cartilages to be dissected free. If the upper lateral cartilages are also separated, this will allow free visualization of the entire nasal septum, not only from a caudal direction but also from above.

Because separation of the medial crura from the septum and division of the fibrous tissue between the domes mean that essential suspension points of the lower lateral cartilages are lost (see **Fig. 6.54**), it is recommended to stabilize the nasal tip before suture repair of the columella with a cartilaginous strut, which is inserted between the medial crura of the lower lateral cartilages (**Fig. 6.34b**). The lower lateral cartilages are also additionally stabilized with an "interdomal suture" to avoid later separation. Exposure of the medial crura of the lower lateral cartilages allows the required sutures (usually absorbable 4/0 material) to be placed directly through the cartilage so they do not need to be inserted through the skin of the membranous septum.

Skin closure begins at the tip of the inverted V with a monofilament 5/0 suture. All five corner points must be exactly reapproximated without any step-off, after which intermediate sutures are placed in between each stitch. The lateral area needs only one suture placed roughly in the middle of the columella and a further (absorbable) suture to repair the marginal incision of the lower lateral cartilage.

Rules, Tips, and Tricks

A columellar incision is practically invisible later on, provided the incisions are correctly made and the suture repair is precise. A fine white incision line will be visible only if the skin is closed under tension. Correct placement of the approximating stitch in the lateral area of the incision on the inner surface of the alae is also important: a step-off can be avoided if the vestibular skin on the undersurface of the lower lateral cartilage is taken only with a superficial bite (without transfixing the cartilage), while the needle is inserted deeply into the wound margin of the nostril. The lower lateral cartilage thus "disappears" behind the caudal incision margin.

A further consideration is the tangential displacement of the wound edges at the lateral incision margin, where a skin fold can develop on the undersurface of the lower lateral cartilage. The tangential displacement must be compensated for by the lateral suture, by placing the stitch of the lower lateral cartilage obliquely in the direction of the nasal tip through the incision margin adjacent to the nostril.

! Risks and Complications

The most feared risk is a visible columella scar, and the worst complication is necrosis of the columella.

Retracted columella scars are very difficult to revise. They can be avoided by using an everting suture technique and ensuring a stable cartilaginous support, which is usually absent in the soft-tissue region between the medial crura of the lower lateral cartilages. Although the columellar skin is relatively thick there, it can nevertheless still retract, especially if the fibrous tissue between the medial crura has been excised. The insertion of a cartilaginous frame between the medial crura, which ends exactly in line with the caudal margin of the lower lateral cartilage, is the best guarantee for healing without retraction. Necrosis of the columella can be expected especially in the presence of severe scar formation as well as with wound breakdown (diabetics, smokers) and significant wound tension. Here the indication for an open approach should be most carefully considered and, if in doubt, an endonasal access chosen. Once necrosis of the columella has occurred, it usually requires a technically demanding staged procedure, in most cases with the use of a forehead flap (see Chapter 5).

Postoperative Care

Crust formation at the columellar incision is dissolved with ointment, and the sutures are removed on about the seventh postoperative day. Sunblock can be used in the scar area for approximately 6 months to avoid pigmentation of the scar.

Osteotomies

Surgical Principle

Osteotomies serve to remove parts of the bony pyramid (hump) or to mobilize them in order to displace them.

Indications

Hump reduction with mobilization of the lateral walls to close the subsequent “open roof.” Mobilization of the pyramid of a crooked or wide nose.

Contraindications

Osteotomy of mobile bony areas.

Specific Points Regarding Informed Consent

Step-offs (palpable or visible), particularly in the region of the nasal dorsum. Excessive callus formation (extremely rare).

Operative Planning

See Surgical Technique.

Special Instruments

There are numerous osteotomes (bevel on both sides, for a straight osteotomy line) and chisels (bevel on one side only, for a curved osteotomy line), which differ mainly in their type of handle and their width. A well-established set of tools is listed in the section on instruments above (**Fig. 6.6b**).

Surgical Technique

Osteotomies at a Glance (Fig. 6.35)

Standard osteotomies include:

- Paramedian osteotomy (on either side of the internasal suture line).
- Lateral osteotomy (in the frontal process of the maxilla).
- Transverse osteotomy (horizontal osteotomy at the level of the medial canthus, through the frontal process of the maxilla and the nasal bones, *not* through the suture lines to the frontal bone, which lie more cranially).

This is also the order in which the osteotomies are usually made.

In special cases, *supplementary osteotomies* are useful:

- Intermediate osteotomy (between paramedian and lateral osteotomy) for curved and severely deviated bony lateral wall.
- Wedge resection after an additional osteotomy above the lateral osteotomy for resection of a bony wedge to compensate for asymmetrical pyramid walls, e.g., for a growth-related crooked nose.

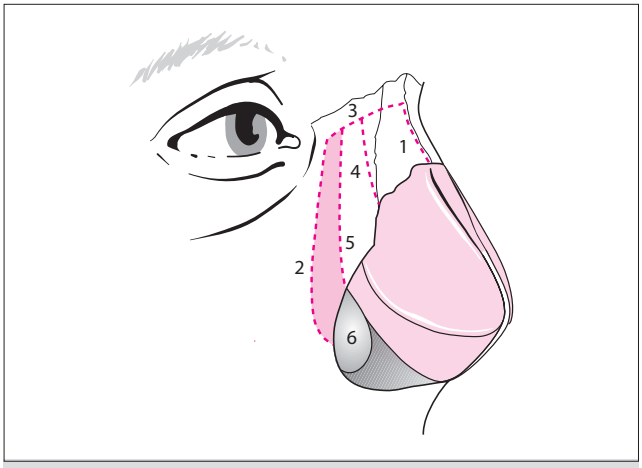

Fig. 6.35 Overview of osteotomies.
Standard osteotomies:
1 paramedian osteotomy (lateral to the internasal suture line)
2 lateral osteotomy (extends to the level of the medial canthus, protects the inferior turbinate [6])
3 transverse osteotomy (is situated at the level of the medial canthus)
Supplementary osteotomies:
4 intermediate osteotomy (between paramedian and lateral osteotomies)
5 wedge resection