

## Extended Retroauricular Temporal Flap with Conchal Cartilage for Alar or Columellar Reconstruction

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### Abstract

**Background:** The retroauricular-temporal or Washio flap has been introduced for reconstruction of partial nose and cheek defects, and has many advantages. We decided to evaluate the extended use of this technique in order to repair full thickness nasal defects.

**Methods:** Superficial temporal and retroauricular arteries are identified with Doppler flowmetry. Selection points A, B, C and D are delineated. Point A is the point around which the entire flap rotates, and is a fixed point in front of the anterior end of the helix and behind the superficial temporal artery. The next step is the selection of point C for the flap to reach the defect. We operated 8 cases utilizing this method to reconstruct alar and columellar defects with chondrum.

**Results:** We found this technique very useful. The advantages of this technique include suitable flap color, good texture, no need for microsurgery experience, donor and recipient sites for surgery are in one field, and the donor site scar is inconspicuous.

**Conclusion:** We find this technique very effective in repairing total subunit (nasal tip) defects. To fully appreciate it, we have to expand the distal part of the flap by including conchal cartilage with it.

**Keywords:** retroauricular-temporal flap, conchal cartilage, full-thickness alar-columellar defect

### Introduction

Washio [1,2] reported a retroauricular-temporal flap after performing angiographic studies of the posterior branch of the superficial temporal and retroauricular arteries. Orticochea [3,4] exhibited the use of a postauricular flap for nose reconstruction. In his method, the flap was tubed and based on ipsilateral branches of the superficial temporal vessels. Fujino et al [5] reported a retroauricular free flap to resurface the dorsum of the nose with microvascular techniques. Nahai et al [6] replanted an avulsed

scalp and exhibited that the ear and postauricular skin can survive on the contralateral superficial temporal vessels. Approximately half the time, the retroauricular branch terminates in the posterior auricular surface and in the other half it continues into the temporo-parietal area [7].

Park et al [8] in their detailed study on the arterial supply of the anterior ear demonstrated that the anterior auricular surface is dominantly supplied by many branches originating from the posterior auricular artery.

Kobayashi et al [9] treated seven patients with a retroauricular hairline flap. A free flap was used to treat all patients, with the exception

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of one patient who was treated with an island flap. However, the importance and efficacy of an extended Washio flap for one-stage reconstruction of the columella and alae with conchal cartilage has not been fully appreciated. With consideration to its many advantages in reconstructing nose and cheek defects, we proposed that by designing a standard delay operation on the distal part of the flap, the extension of the flap for resurfacing defects is increased.

Furthermore, we can use conchal cartilage for nose defects in a one-stage flap design.

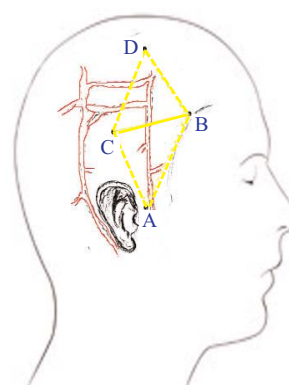
### Methods

#### *Anatomic study*

The vascular supply of the ear originates from the superficial temporal and the posterior auricular arteries. There is a significant connection between them; however this site of connection is not anatomically constant. Usually one branch arises from the superficial temporal artery before it terminates into temporal and parietal artery branches and courses through the superior sulcus, superior to the root of the ear to connect with the posterior auricular artery. Sometimes, the well-formed branch arises from the parietal branch of the superficial temporal artery.

It is very important that we note the connection that exists between these two systems in a more cranial position, which forms a second arcade. This arcade is used in the Washio flap where postauricular skin is pedicled on the superficial temporal vessels to reconstruct the nose [2].

A very important finding is that there is always a distance between the synonymous arteries and veins. The distance between the superficial temporal artery and temporal vein is usually 1.9 cm. The greatest distance between the anterior branches of the superficial temporal artery and vein is 4 cm. During operation the surrounding temporal fascia should be preserved as a protective tissue to the superficial temporal vessels.



Flap design:  
 $AC = \frac{1}{2} AN \sim 7 \text{ cm}$   
 $AB = 60^\circ$   
 $ABC \sim DBC$   
 $AB \sim 8 \text{ cm}$

Fig. 1. Flap design by the authors.

Therefore, as mentioned there are many anastomoses between the superficial temporal artery and retroauricular (postauricular) artery, and with incorporating these two arteries in one designed flap, we can elevate one perfect flap of the temporal scalp region without delay.

We can locate the superficial temporal artery and retroauricular artery with Doppler flowme-

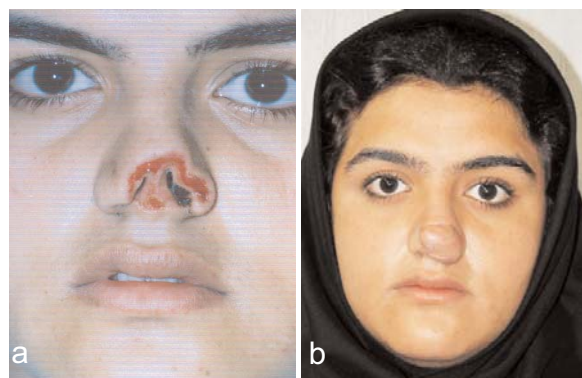


Fig. 2. Nasal amputation by knife, pre and post op (ant. view).

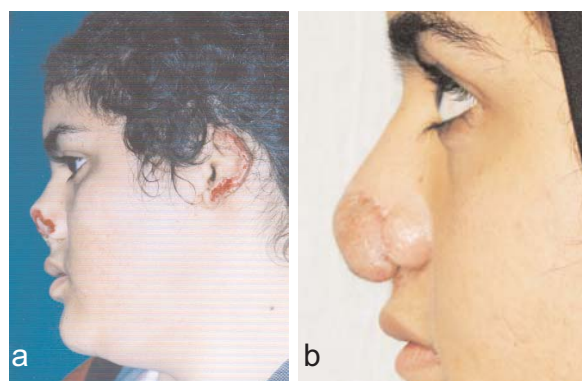


Fig. 3. Nasal amputation by knife, pre and post op (lat. view).



Fig. 4. Nasal SCC (ant. & lat. view) before surgery.

ter technique. After identification of the arteries, the selection points A, B, C and D are delineated (Fig. 1). Point A is the point around which the entire flap rotates; it is a fixed point in front of the anterior end of the helix and behind the superficial temporal artery. The next step is the selection of point C for the flap to reach the defect. Line AC must be nearly half the length of the distance between point A and the defect.

To avoid injury to the superficial temporal artery and also to facilitate an effective design for the flap, line AC is directed  $10^{\circ}$  to  $15^{\circ}$  posteriorly from an imaginary vertical line drawn through point A.

The selection of point B is important since line AB forms the base of the pedicle. Angle CAB should be about  $60^{\circ}$ . The point can be selected near this line (Fig. 1).

Point D is marked in such a way that the two triangles ABC and DBC are symmetrical and form a rhomboid ABCD.

The margin for the rest of the flap is drawn in a curve from point D in order to include the retroauricular vessels and postauricular skin. After this design we can use this flap for total nose tip defects, the anophthalmic socket or other facial defects.

#### *Surgical technique*

The course of the superficial temporal artery, superior auricular artery, retroauricular artery, and frontal branch of the superficial temporal artery were all detected with Doppler flowme-

ter and marked on the patients' face.

After flap design in the postero-inferior area of the ear, we can evaluate the nasal cartilage defect and design the conchal incisions for the flap. A very important point in cartilage design is that the cartilage should be inserted in a part of the flap which, upon rotating the flap, can provide coverage and substitute a point in the lateral crural nasal defect.

A pear-shaped large arterial retroauricular flap nearly 7 cm long and 7 cm wide was marked on the posterior surface of the ear, postauricular area, and mastoid region. The skin and auricular muscles on each side of the incisions were elevated to expose the superficial temporal artery and vein. All these vessels could be seen through the temporal fascia.

After incision on the border of the flap and elevation of the flap with the galea aponeurotica, the AC incision with made under direct vision.

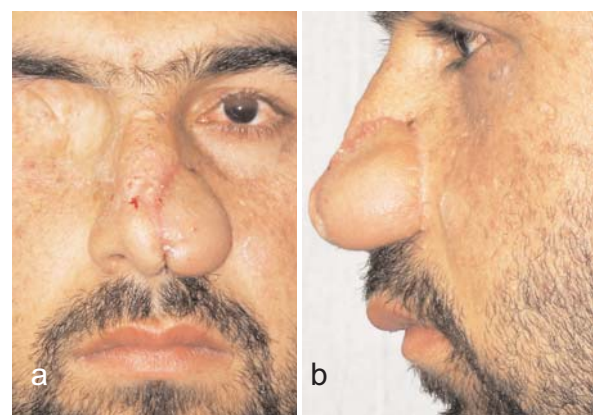


Fig. 5. Nasal SCC (ant. & lat. view) after surgery.



Fig. 6. Cleft lip nose deformity pre & post after columella repair.

Then we cut a correct piece of conchal cartilage estimated for the lateral alar cartilage defect. At the recipient site, we separated the mucous membrane and skin and in the distal flap site, the flap was reflected to construct the inner lining and sutured to the nasal mucous layer in a manner that the conchal cartilage was aligned in continuity with the alar cartilage and sutured to the upper lateral cartilage and nasal septum.

For outer linings, the remnant of the flap can be reflected upward and sutured to nasal skin. This technique was performed in 8 cases from 1997 to 2005. The age range of the patients was from 4 to 27 years old. One patient was selected for columella reconstruction and the 7 others were candidates for total alar reconstruction.

#### Cases

Case 1. A 21 year-old Afghan woman with a knife injury to the entire nasal tip. She was wounded by her husband (Figs. 2, 3).

Case 2. A 25 year-old man with SCC in the left alar region with peripheral extension (Figs. 4, 5).

Case 3. A 14 year-old girl referred with columellar defect after repair of cleft lip and palate deformity (Fig. 6).

Case 4. A 9 year-old girl with a lesion in the right alar area and nostril deformity (Figs. 7, 8).

#### Results

Eight patients were operated with this tech-

nique from 1997 to 2005 at our department. Large defects of the nose in these patients were reconstructed satisfactorily.

Advantages of this technique are:

- 1) The color of the designed flap is very suitable and compatible with the recipient site.
- 2) The flap has very good texture and is compatible with the texture of the recipient site.
- 3) There is no need for microsurgery techniques in the reconstruction.
- 4) Donor and recipient sites are in one field and there is no need to change the position of the patient during the operation.
- 5) Scar formation in the donor site is negligible.
- 6) After repositioning the flap remnant to the donor site, in nearly all patients, there is no need to use a skin graft for coverage and the remnant of the flap is adequate to provide coverage for



Fig. 7. Traumatic lesion in right ala.

the donor site defect.

7) Inner and outer linings and cartilage defects can be reconstructed in a one-stage procedure.

Disadvantages of this technique are:

1) Need for a two-stage operation for the patient.

2) In the time interval between the two stages, there is some disfiguring in the appearance of the patient.

3) Occasionally, the newly constructed nose was swollen and congested without necrosis of any part.

4) In the perioperative period there is no complication at all.

### Discussion

In reconstructive surgery, the skin of the retroauricular region provides a fine-textured, scanty fatty tissue and a good colour match for the face and can be used without leaving a conspicuous donor site.

Various retroauricular flaps have been devised and used in the past 25 years. Morrison et al [10] reported that reconstruction of an external nasal defect presents a challenge to the reconstructive surgeon and their results confirm that the Washio retroauricular flap is an excellent technique for difficult nasal reconstructions in young patients. However, they did not mention a one-stage operation for soft tissue and chondral defects. Nevertheless, flaps designed in a manner to reconstruct cartilage defects simultaneously are very seldom advised.

We have used this technique without any complications and with a few advantages.

Song et al [7] reported that there is a possibility that the blood supply might not be adequate to enable it to be folded primarily to reconstruct the inferior aspect of the nose due to ischemia and necrosis, but in our experience we used this technique without any complication.

The supraauricular artery and its concomitant veins are fairly large in size and relatively constant in existence.

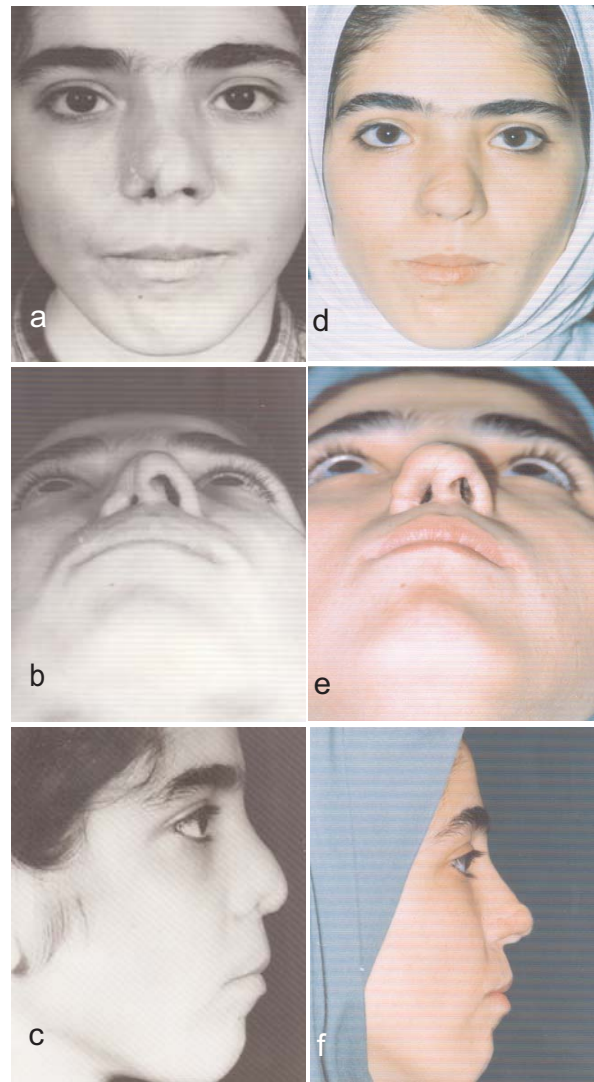


Fig. 8. Traumatic lesion in right ala (before & after repair).

It is believed that recognition and use of this artery will not only make it possible to raise large retroauricular arterial flaps for the reconstruction of a lost nose but also facilitate a total ear reconstruction. We believe that the design of an extended flap based on this artery is practical without any need for microsurgical techniques.

Hard and Montandon concluded that this method is a very useful tool for difficult nasal reconstructions in young individuals. It is a safe procedure (not to be compared with free flaps of the same region) and it provides thin skin and cartilage that can be adopted for different types

of defects. As compared with most other techniques, it leaves no additional scar on the face.

In our past experience [12] different techniques have been used for reconstruction of the columella employing perioral tissue; for example V-Y plasty for columellar lengthening and for head flaps, but nasolabial and frontal flaps leave visible facial scars.

It is hoped that this research might arouse the interest of other researchers with better facilities so that a more thorough anatomic study will be carried out.

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