

# Flap update 2025: Part 1 sliding flaps

By Vixey Silva, DO, Mohammad Fardos, DO, and Cynthia Bartus, MD, FAAD



**Vixey Silva, DO,** is a PGY-4 at HCA Healthcare/USF Morsani College of Medicine GME: HCA Florida Largo Hospital, in Largo, Florida.



**Mohammad Fardos, DO,** is a PGY-4 at HCA Healthcare/USF Morsani College of Medicine GME: HCA Florida Largo Hospital, in Largo, Florida.



**Cynthia Bartus, MD, FAAD,** is program director of the dermatology residency program at Lehigh Valley Health Network and Philadelphia College of Osteopathic Medicine. She is also the program director of the Mohs micrographic surgery and dermatologic oncology fellowship program.

## Terminology

**Body:** Portion of skin that is advanced, transposed, rotated, or interpolated into the primary defect site.

**Pedicle:** Vascular base of the flap that remains intact to preserve blood supply to the flap body.

**Primary defect:** Area devoid of skin that receives tissue from the flap.

**Secondary defect:** Donor site from which tissue is mobilized to create the flap; results in a new defect.

**Primary flap movement:** Initial motion of the flap required to close the primary defect.

**Secondary flap movement:** Additional tissue movement needed to close the secondary defect created by the flap's mobilization.

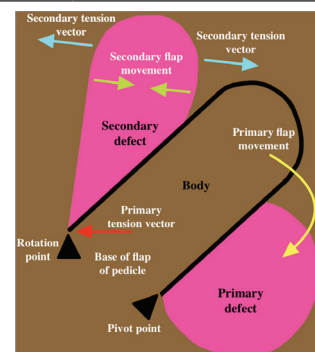
**Primary tension vector:** Direction of force resisting the movement of the flap into the primary defect.

**Secondary tension vector:** Direction of force generated during closure of the secondary (donor site) defect.

**Flap tip:** Distal portion of the flap farthest from the pedicle and blood supply; area most vulnerable to ischemia and necrosis.

**Pivot point:** Fixed point at the base of a flap around which the flap moves. Adequate undermining is necessary for optimal mobility.

**Key stitch:** First suture placed to secure and accurately position the flap into the primary defect; ensures proper alignment and distribution of tension.



**Note:** The grouping of advancement and rotation flaps in this section (Part 1) reflects their shared primary movement of sliding tissue into the defect.

\***Key stitch** locations are marked with a **green circle** where applicable on the flaps described below

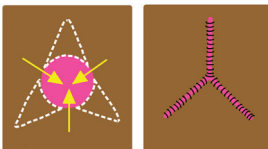
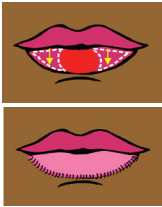
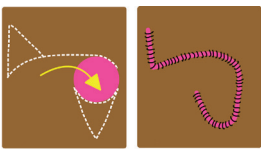

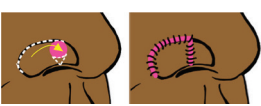
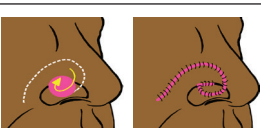
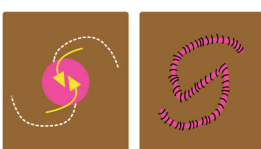
## Advancement flaps

- **Primary movement:** Slides tissue unidirectionally or bidirectionally; results in a series of straight lines upon closure.
- **Tension vector:** Tension remains in the direction of flap movement without alteration of wound's original tension vector.
- **Considerations:** (1) Moves tissue directly forward in a linear direction to close a defect while displacing Burow's triangles away from free margins to minimize distortion of critical anatomical structures. (2) Random pattern flaps relying on the subcutaneous and dermal vascular plexus for survival. (3) Designed with tangents (a line that touches a curve/curved surface at a single point without crossing into the curve's interior) in mind to ensure smooth closure and optimal tension distribution.

Type	Description	Image
Unilateral advancement flap (O to L)	<p><b>Design:</b> Utilizes two asymmetric Burow's triangles to advance tissue into the defect. Takes advantage of tissue laxity on one side, creating "L-shaped" closure.</p> <p><b>Locations:</b> Forehead and nose, particularly for nasal tip or sidewall defects.</p> <p><b>Considerations:</b> Often referred to as the "east-to-west" flap when used on the nasal tip.</p>	
Unilateral double tangent advancement flap (O to U)	<p><b>Design:</b> Utilizes two parallel tangents and Burow's triangles to advance tissue into the defect, creating a "U-shaped" closure.</p> <p><b>Locations:</b> Helical rim and suprabrow region.</p> <p><b>Considerations:</b> Due to its small pedicle, this flap is prone to ischemia.</p>	
Bilateral single tangent advancement flap (O to T)	<p><b>Design:</b> Advances tissue from opposite sides of the defect along a single tangent, creating a "T-shaped" closure.</p> <p><b>Locations:</b> Forehead, suprabrow, and chin.</p> <p><b>Considerations:</b> Height of the flap should be twice the diameter of the defect.</p>	
Bilateral double tangent advancement flap (O to H, H-plasty)	<p><b>Design:</b> Advances tissue from both sides along two parallel tangents, creating a "H-shaped" closure.</p> <p><b>Locations:</b> Used for defects on the mid-forehead, suprabrow, and glabella.</p> <p><b>Considerations:</b> Can result in forehead numbness due to long horizontal incision lines.</p>	
Crescentic advancement	<p><b>Design:</b> Excision of a crescent-shaped area of skin adjacent to the defect enables tissue advancement and linear closure. Primary movement is unilateral (lateral to medial).</p> <p><b>Locations:</b> Medium-to-large defects of the medial cheek, nasofacial sulcus, and lateral nose.</p> <p><b>Considerations:</b> Some view it as a variation of a linear closure, while others consider it a modified version of an O to L flap.</p>	
Island pedicle (V-Y advancement flap)	<p><b>Design:</b> A triangular flap completely separated from adjacent lateral skin retaining an underlying vascular pedicle attached to the subcutis.</p> <p><b>Locations:</b> Small to medium wounds on the upper cutaneous lip, nasal ala, lateral brow, nasal dorsum, cheek, and forehead.</p> <p><b>Considerations:</b> (1) 40-50% of the pedicle should remain intact to enhance flap survival. (2) Length should be 3-4 times the width of the surgical defect.</p>	

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Mercedes flap (Triple advancement flap)	<p><b>Design:</b> Three advancing triangular flaps arranged around a central defect. These flaps are designed to advance into the defect area with minimal tension.</p> <p><b>Locations:</b> Scalp, trunk, temples</p> <p><b>Considerations:</b> Simultaneous excision of Burrow's triangles can be an effective technique for full-thickness skin transplantation in cases of large defects or defects in challenging areas.</p> <p><b>Disadvantages:</b> (1) Star-like appearance may be undesirable in highly visible areas (e.g., cheeks, forehead). (2) Risk of dog-ear formation or excessive tension if not carefully designed.</p>	
Mucosal advancement flap	<p><b>Design:</b> Involves advancing mucosal tissue to restore the vermillion of the lip.</p> <p><b>Locations:</b> Lip</p> <p><b>Considerations:</b> (1) Undermine deep to the minor salivary glands and superficial to the orbicularis oris muscle. (2) Temporary loss of sensation in the reconstructed area may occur.</p> <p><b>Disadvantages:</b> May result in increased vermillion show; alternatively, this may be an advantage for some patients.</p>	
<p style="text-align: center;"><b>Rotation flaps</b></p> <ul style="list-style-type: none"> <li>Primary movement: Rotational movement around a pivot point; requires extensive undermining at areas of pivotal restraint.</li> <li>Tension vector: Redirects primary tension vectors away from free margins; ideal for defects near arcing junctions of cosmetic subunits or curved relaxed skin tension lines.</li> <li>Considerations: (1) Flap arc length must be significantly longer than the primary defect's width. (2) Flap height must exceed the defect's height to compensate for functional loss when rotated. (3) Use of back-cuts or Burrow's triangles can increase flap mobility and reduce tension.</li> </ul>		
Single curvilinear tangent advancement (Standard rotation flap, Mustardé flap)	<p><b>Design:</b> Utilizes a single curved incision line to rotate tissue into the defect. The Mustardé flap uses cheek and temple skin to close lower eyelid or infraorbital defects. The flap's primary motion supports the lower eyelid.</p> <p><b>Locations:</b> Cheek, chin, mental crease, and scalp.</p>	
Dorsal nasal flap (Rieger flap)	<p><b>Design:</b> Displaces the Burrow's triangle from the nasal tip to the glabella and follows an arc that extends from the inferior aspect of the defect to the nasofacial sulcus and onto the glabella.</p> <p><b>Locations:</b> Moderately sized distal nasal defects.</p> <p><b>Considerations:</b> (1) The angular artery is the major source of blood supply for this flap. (2) The body of the flap must be dissected just above the perichondrium. (3) The medial canthal tendon acts as the pivotal restraint.</p> <p><b>Disadvantages:</b> (1) Potential for transposition of thick glabellar skin onto the medial canthus. (2) Potential "pig-nose" deformity due to inadequate undermining and unwanted secondary tension vectors.</p>	
Alar rotation	<p><b>Design:</b> Utilizes a crescent-shaped incision along the alar groove to rotate tissue into the defect.</p> <p><b>Locations:</b> Small defects on the nasal ala.</p> <p><b>Disadvantages:</b> Contraction may result in alar notching.</p>	
Spiral rotation	<p><b>Design:</b> Utilizes a curved incision to follow the natural contours of the nasal ala and sidewall; elevated tissue rotates into the defect in a spiral pattern.</p> <p><b>Locations:</b> Larger defects of the nasal ala and lower nasal sidewall.</p>	
O to Z (double rotation flap)	<p><b>Design:</b> Utilizes two rotation flaps starting at opposite ends of the defect with both incisions taking off in the same direction (either clockwise or counterclockwise).</p> <p><b>Locations:</b> Large defects on the scalp.</p> <p><b>Considerations:</b> Prominent incision lines.</p>	

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