Head and Neck Reconstruction
with Myocutaneous and Fasciocutaneous Flaps

Amy K Hsu
NYPH – Weill Cornell Medical Center
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BASIC FLAP THEORY
Flap Reconstruction

- Contouring
- Resurfacing
- Exposed surfaces (carotid, skin defect)
- Recreate resected lumen
- Improving function by providing tissue bulk
- Bring healthy tissue into defect site (non-irradiated)
Blood Supply To Skin

- **Segmental Vessels**
  - Large vessels
  - Deep to muscle
  - Gives rise to perforators
  - Perfusion pressure similar to aorta

- **Perforator Vessels**
  - Perfuses muscle
  - Communication between deeper segmental vessels and cutaneous vessels (e.g., thoracoacromial artery, intercostal perforators)

- **Cutaneous Vessels**
  - Musculocutaneous: dominant supply to skin, perpendicular
  - Direct Cutaneous: parallel, associated with vein, larger perfusion area

- **Subdermal Plexus**

- **Dermal Plexus**
Fig. 123-1. Blood supply to the skin.
Types of Cutaneous Flaps

- Fasciocutaneous
  - Axial
    - Vessels (direct cutaneous) follow long axis of flap and supply dermal / subdermal plexus
    - Viability related to length of vessel
  - Random
    - Blood supply from musculocutaneous arteries via dermal / subdermal plexus
    - Maximum viable length related to base:length ratio
- Myocutaneous
  - Blood supply from perforators in underlying muscle
Fig. 123-2. Classification of skin flaps.
Optimizing Flap Viability

- **Patient factors**
  - Good nutritional status
  - Diabetic, Smoker
  - Adequate hemoglobin level
- **Surgical technique**
  - Advance flap planning
  - Minimize tension, kinking, and pressure
  - Adequate hemostasis to avoid hematoma
  - Adequate dimensions of subcutaneous tunnel to prevent pressure from overlying skin in tunneled flap
- **Delay phenomenon**
- **Arteriography**
Assessing Flap Viability

- Color
  - Pale/White: inadequate arterial flow
  - Dusky/Blue: inadequate venous drainage

- Dermal Bleeding
  - Areas of dark bleeding
  - Needle prick test

- Fluorescein Dye
  - Intact circulation fluoresces with UV light
  - Absence of fluorescence suggests poor capillary diffusion and possible future necrosis
Enhancing Flap Viability

- Postoperative Management
  - Evacuation of hematoma
  - Properly functioning drainage tubes (separate drainage for defect and donor site)
  - Antibiotic prophylaxis
- Minimize Ischemic Insults
  - Heparin
  - Steroids
  - ASA and dipyridamole
- Methods with potential application
  - Vasodilators, hyperbaric oxygen, hypertensive perfusion, hypothermia, Dextran
Flap Types

- Pectoralis Major
- Deltopectoral
- Latissimus Dorsi
- Trapezius
Pectoralis Major Flap
Surgical Anatomy

- **Flap Type:** Myocutaneous

- **Borders**
  - Superior: medial half of clavicle
  - Inferior: cartilaginous portions of 6th-7th ribs
  - Medial: lateral border of sternum
  - Lateral: proximal sulcus of humerus

- **Nerve Supply**
  - Lateral pectoral nerve: travels medially on deep surface of muscle
  - Medial pectoral nerve: pierces pectoralis minor, 2-3 branches to pectoralis major
Surgical Anatomy

- Vascular Supply
  - Dominant supply
    - Pectoral branch of thoracoacromial artery forms segmental blood supply
  - Adjunctive supply
    - Lateral thoracic artery
    - Pectoral branches of intercostal arteries
Indications

- Intraoral defects (tongue, FOM, tonsillar fossa)
- External cutaneous defects
- Combined intraoral and cutaneous defects
- Circumferential pharyngo-esophageal defects
- Laryngopharyngectomy with skin defect
- Temporal bone resection
- Orbital or facial defects
- Esophageal stricture with esophageal reconstruction
- Pyriform fossa defect
- Exposed carotid artery
Types of Pectoralis Flaps

- Myocutaneous “peninsula”: muscle and skin raised together
- Myocutaneous “island”: muscle provides pedicle, island of skin raised on lower part of muscle
- Neurovascular island: vascular pedicle, distal portion with muscle and overlying skin
Surgical Technique

- After dissection down to the pectoralis fascia, the pectoralis muscle is incised and divided along muscle fiber bundles.
- Pectoralis major is elevated medially away from chest wall and underlying pectoralis minor thus permitting identification of the neurovascular bundle on the undersurface of the pectoralis major.
- Muscle splitting incision is then extended inferomedially and parallel to nutrient vessels.
- Incision is made around the circumference of the distal parasternal cutaneous flap (skin paddle) to prepare it to fit into surgical defect in the head/neck.
- Muscle pedicle is dissected proximally up towards the clavicle.
- Flap positioned in the neck through a subcutaneous tunnel with the axis of rotation around the midclavicle.
- Skin paddle may be trimmed to the appropriate size/shape/thickness to fit defect.
Fig. 14.60 Composite peninsular flap
Fig. 14.61 Myocutaneous island flap
Advantages

- Single stage reconstructive procedure
- Can be done with patient supine (no repositioning necessary)
- Minimal donor site morbidity, easy to harvest
- Robust flap with strong axial blood supply
- Large cutaneous surface available
- Maximal arc of rotation and maximal reach (up to lateral canthus)
- Restores resected tissue bulk
- Excellent protection for exposed carotid artery
- Cosmetically acceptable
- Subsequent use of other regional flaps is possible
Disadvantages

- Cutaneous portion of flap may have hair
- Color match to facial skin not ideal
- Post-op scarring and deformity of chest, breast deformity in women
- Transfer of excessive tissue bulk (usually cosmetic but may be functional as well)
- Lengthens surgical procedure
- Loss of pectoralis function (especially if concurrent injury to CN XI)
Delto-Pectoral Flaps
Surgical Anatomy

- Flap Type: Fasciocutaneous
- Borders:
  - Superior: length of clavicle
  - Inferior: middle portion of pectoralis muscle (depends on width of flap taken)
  - Medial: lateral aspect of sternum
  - Lateral: deltoid muscle to posterior axillary line (depends on length of flap taken)
- Vascular Supply
  - Perforating branches of 2nd-4th intercostal artery (from internal mammary artery)
  - Deltoid perforator in mid-lateral position of shoulder
  - Axial flap medial to deltopectoral groove, random flap laterally
Surgical Technique

- Intercostal perforators become the pedicle
- Fascia must be included in flap (anastamosing vessels lie just superficial to the deep fascia covering the pectoralis major and deltoid muscles)
- To fill longer defects, this flap can be extended posteriorly or down arm (delayed/two-staged procedure)
- If there is doubt to viability of flap, especially in the elderly, it can be delayed for 10 days prior to placement
- Closure of donor site with skin graft
Considerations

- **Indications**
  - Internal and external defects of oral cavity, oropharynx, hypopharynx
  - Facial reconstruction with large cutaneous defects
  - Carotid coverage after pharyngocutaneous fistula formation
  - Hypopharyngeal reconstruction

- **Advantages**
  - Best color match and texture for facial reconstruction
  - Flap can reach as high as the zygomatic arch
  - Thinner than pectoralis (reconstruction of skin, mucosal surfaces)

- **Disadvantages**
  - Leaves unsightly donor site
  - May require a delayed/two-staged procedure
  - Contraindicated if prior cardiac surgery (use of internal mammary artery)
Latissimus Dorsi Flaps
Surgical Anatomy

- Flap Type: Myocutaneous
- Borders
  - Medial: posterior spine
  - Lateral: posterior axillary fold
- Vascular Supply
  - Predominantly from the thoracodorsal artery arising from the subscapular artery (enters the latissimus muscle 12 cm below the axilla along the posterior axillary fold)
  - Adjunctive supply from perforating branches of intercostal arteries
Surgical Technique

- Incise anterior border of latissimus muscle flap and skin island, and raise the muscle off the chest wall
- Identify pedicle as it enters the muscle and dissect it as far as the axillary vessels
- When the vascular pedicle has been separated from the rest of the muscle, the muscle itself can be divided just proximal to the insertion of the pedicle, allowing for great mobility
- Muscle flap and skin island is passed deep to the pectoral head of the pectoralis major, brought through the muscle below the clavicle, and passed beneath the skin of the neck to resurface either face or skull
Advantages

- Indications: similar to those of pectoralis major flap (less common), also used for breast reconstruction
- Out of irradiated field
- Residual donor defect of less than 10 cm in width can be closed by undermining and advancement of wound edges
- Versatile flap with large amount of skin and soft tissue, latissimus dorsi covers most of back, and portions of it may be used at a time
- Extended arc of rotation (to vertex of scalp)
- Muscle is supplied by multiple vascular pedicle perforators on the whole of its deep surface
- Less hair transfer
- Potential for bilobed skin islands
Disadvantages

- Color match to facial skin is poor
- Flap may be bulky in large patients
- Requires repositioning to lateral decubitus
- Propensity for seroma formation at donor site
- Requires extended tunneling between pectoralis major/minor
- Functional defect in patients with radical neck dissection and sacrifice of CN XI
Trapezius Flaps
Surgical Considerations

- **Superiorly Based (Upper) Trapezius Flap**:
  - Blood supply: occipital artery, paraspinal perforators
  - Reliable flap, limited arc of rotations, may require skin graft

- **Lateral Island Trapezius Flap**
  - Blood supply: superficial branches of transverse cervical artery
  - Uses: defects of oropharynx, posterior oral cavity, hypopharynx

- **Inferior (Lower) Trapezius Island Flap**
  - Blood supply: descending branches of transverse cervical artery, dorsal scapular artery
  - Long pedicle, most commonly used trapezius flap
Fig. 14.63 Trapezius flap  A. and B. Anterior  C.-E. Posterior
Considerations

- **Indications:** oropharyngeal and hypopharyngeal defects, lateral neck, posterior face

- **Advantages:**
  - Three forms allow for versatility
  - Relatively flat and thin
  - Single stage procedure

- **Disadvantages:**
  - Relatively limited arc of rotation
  - Significant donor site morbidity (upper extremity weakness)
  - May require skin graft closure
  - Weaker blood supply
  - Awkward positioning
Summary of Vascular Supply

- **Pectoralis**
  - Pectoral branch of thoracoacromial artery
- **Deltopectoral**
  - Intercostal perforators from internal mammary artery
- **Latissimus Dorsi**
  - Thoracodorsal artery (from subscapular artery)
- **Trapezius**
  - Occipital artery, transverse cervical artery
THANK YOU

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References


