Facial Lacerations: Tips and Tricks for Repair

Alison Kaye, MD
Associate Professor Plastic Surgery
Children’s Mercy Kansas City
Objectives

- Describe appropriate examination of soft tissue trauma to the face including important deep structures that may be affected by laceration injury
- Name at least three fundamental goals of facial laceration repair
- Understand the clinical differences between absorbable and non-absorbable suture and when to use each
- Understand when to consider using deep/buried sutures when repairing a laceration
Disclosures

• I have no relevant financial or non-financial disclosures related to this talk
Facial Trauma

- Soft Tissue
- Facial bones
- Special Structures
Soft Tissue Injuries

- Hematoma
- Abrasions
- Lacerations
- Avulsions
- Amputations
- Impaled objects/Foreign bodies
- Burns
Goals of Soft Tissue Management

- Identify all injuries
- Know the anatomy
- Optimize conditions
- Meticulous repair
- Appropriate referrals
- Manage expectations
Wound Examination

- Location
- Wound size and depth
- Characteristics of wound
  - straight versus irregular?
  - missing tissue?
- Contamination
- Exposed structures
  - fat, muscle, cartilage, bone
Wound Examination

- Sensory exam
- Motor exam
- Ophtho injury
- Dental trauma
- Facial bone fracture
Wound Examination

Possible frontal nerve or supraorbital nerve injury

Possible injury to parotid, Stensen’s duct, facial nerve
Knowledge Check

Which of the follow BEST describes a fundamental concept of laceration repair?

A. Aims to restore normal form and function
B. Aims to minimize scarring
C. Should always include irrigation of tissues and debridement of nonviable tissue or debris
D. Aims for precise approximation of tissues without undue tension
E. All of the above
Fundamentals of Repair

- Restore normal form and function
- Minimize scarring
- Optimize primary healing
- Debride all nonviable tissue and debris
- Precise approximation of skin edges
- Closure without tension
Fundamentals of Repair

- Irrigate
  - Irrigate
    - Irrigate
      - Irrigate
Fundamentals of Repair

- Anatomic alignment of laceration
- Use facial landmarks when available
  - Hair, vermilion, creases/wrinkles
- Use irregularities in wound
Suturing Techniques

Decisions, decisions

• Suture material?
• Closure technique?
• Deep stitches?
Suturing Techniques

Suture Considerations

• Absorbable / Permanent
• Natural / Synthetic
• Monofilament / Multifilament
• Suture size
• Needle size and tip
Knowledge Check

True or False?

Absorbable suture is always the best choice for laceration repair in pediatric patients.
# Suture Material

<table>
<thead>
<tr>
<th>Absorbable</th>
<th>VS</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Abrasions</td>
<td></td>
<td>• Looks better!</td>
</tr>
<tr>
<td>• Hair</td>
<td></td>
<td>• No “railroad tracks”</td>
</tr>
<tr>
<td>• Mucous membranes</td>
<td></td>
<td>• Must remove 3-6 days</td>
</tr>
<tr>
<td>• Young child</td>
<td></td>
<td>• Cooperative patient</td>
</tr>
<tr>
<td>• Unreliable patient</td>
<td></td>
<td>• Reliable patient</td>
</tr>
</tbody>
</table>
# Absorbable vs Permanent Suture

<table>
<thead>
<tr>
<th>Suture</th>
<th>Reactivity</th>
<th>Strength</th>
<th>Uses</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromic Gut</td>
<td>Very</td>
<td>1-3 weeks</td>
<td>Mucosa, Scalp</td>
<td>3-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-0</td>
</tr>
<tr>
<td>Fast-absorbing Plain Gut</td>
<td>Very</td>
<td>5-7 days</td>
<td>Skin</td>
<td>5-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-0*</td>
</tr>
<tr>
<td>Vicryl</td>
<td>Mild-Moderate</td>
<td>1-3 weeks</td>
<td>Dermis, Muscle, Fascia</td>
<td>3-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-0</td>
</tr>
<tr>
<td>Monocryl</td>
<td>Mild-Moderate</td>
<td>1-3 weeks</td>
<td>Dermis, Muscle, Cartilage, Fascia</td>
<td>3-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-0</td>
</tr>
</tbody>
</table>

- **Reactivity**
  - Inflammation
  - Scarring

- **Strength**
  - Holds wound together
## Absorbable vs Permanent Suture

<table>
<thead>
<tr>
<th>Suture</th>
<th>Reactivity</th>
<th>Strength</th>
<th>Uses</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolene</td>
<td>Minimal</td>
<td>Moderate-High</td>
<td>Skin Tendon</td>
<td>4-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-0</td>
</tr>
<tr>
<td>Nylon</td>
<td>Minimal</td>
<td>Moderate-High</td>
<td>Skin Tendon</td>
<td>4-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6-0</td>
</tr>
<tr>
<td>Silk</td>
<td>Very</td>
<td>Low</td>
<td>XXXXX</td>
<td>XXXXX</td>
</tr>
</tbody>
</table>

- **Reactivity**
  - Inflammation
  - Scarring

- **Strength**
  - Holds wound together

*Children’s Mercy Kansas City*
Wound Care and Scarring

- Wound strength 20% of normal at 3 weeks
- 70% of normal at 6 weeks
- Healed scar 75-80% normal

Continued collagen remodeling up to a year
What kind of suture do I use?

**EYE BROW**
- 5-0 fast

**SKIN**
- 6-0 fast/plain prolene/nylon

**SCALP**
- 3-0, 4-0, 5-0 chromic;
- 4-0, 5-0 monocryl

**ORAL MUCOSA**
- 4-0, 5-0 chromic

**EYELID**
- 6-0 fast, prolene/nylon

**LIP**
- 5-0, 6-0 chromic/fast/plain
Suturing Techniques

Goals of skin sutures

- **Restore Form**
- Precise approximation of wound edges
- Slight eversion of edges
- No residual gaps
Knowledge Check

When should you consider placing buried/deep sutures as part of laceration repair?

A. When there is a full thickness defect and visible subcutaneous fat
B. In areas of minimal tension
C. In areas of limited motion
D. Only when you have extra time
E. All of the above
When do I need deep sutures?

Deep wound (into subcutaneous fat) + Area of tension or motion = GAP
Suturing Techniques

**Deep Dermal Sutures**

- Provide strength
- Relieves tension on wound edges
- Aligns wound edges
- 4-0 or 5-0
- Vicryl or Monocryl

**Epidermis**

**Dermis**

**Deep dermal stitch**

**Subcutaneous fat**

**Bury knot away from surface**
Suturing Techniques

Simple Interrupted Sutures

- Simple and most common
- Some strength
- Sutures independent of each other
- Time consuming
- Knots weaken suture
- Air knots

• Irregular wound
• “Insurance”
Suturing Techniques

Running Sutures

• Simple
• Fast
• Distribution of tension
• Straight lacerations
• Sutures dependent on each other

‘over and over’
‘baseball stitch’
‘whip stitch’

[Image of sutured skin]
Suturing Techniques

Running Subcuticular

- Common surgical stitch
- Minimal strength
- Excellent cosmesis
- Straight laceration
- Clean laceration
- Combine with deep sutures
- No track marks
Suturing Techniques

Horizontal Mattress

Vertical Mattress

Mattress Sutures

- Powerful techniques for eversion
- Particular skin types
  - Posterior Ear
  - Back
  - Hand, Foot
- Horizontal: thin skin – use resorbable
- Vertical: thick skin – use permanent
- Too tight – will cause edge necrosis
Suturing Pearls

• Make it look better than when you started
  • Spacing, size, knot position
  • Rule of halves
• Don’t be sloppy
• Ok to try again
• Clean things up
Knowledge Check

Tissue adhesive/Skin glue is BEST suited for repair of which type of wound?

A. Full thickness laceration with gaping wound edges
B. Wound under tension
C. Partial thickness wound with well-approximated edges
D. A wound with visible debris
E. A wound on the eyelid
Surgical Tissue Adhesive

• ‘Favorable’ well-approximated wounds
• Partial thickness lacerations
• Keep approximated until set
• Use in conjunction with deep sutures
• Sets up in wet field
• Broken down by petroleum products
• Can be allergenic
• Can cause pain
• **Caution near the eye
Suturing Techniques

- Deep stitches?
- Suture material?
- Skin closure?

Partial thickness
No Gap
Suturing Techniques

- No deep stitches
- 6-0 prolene
- Continuous skin closure
Suturing Techniques

- Deep stitches?
- Suture material?
- Skin closure?

Full-thickness

Gap with visible fat
Suturing Techniques

- Interrupted deep dermal sutures
- 5-0 vicryl/monocryl
- Continuous over and over
- 6-0 fast absorbing plain gut
Suturing Techniques

- Partial thickness
- Full thickness
- Gap

Eyebrow disruption

- Deep stitches?
- Suture material?
- Skin closure?
Suturing Techniques

Partial thickness:
• No deep stitches

Full thickness:
• Deep dermals 5-0 vicryl

Skin: 6-0 running prolene

Eyebrow: 5-0 fast absorbing
Special Structures

• Scalp
• Eyes
• Ears
• Lips
Scalp Lacerations

- Very vascular
- Hair!!
- Deep: 4-0 vicryl/monocryl
- Skin: Absorbable sutures 3-0, 4-0, 5-0 chromic/monocryl
- Continuous suture for hemostasis
- Staples? Glue?
Scalp Lacerations

6 weeks later

Alopecia can be persistent
Periorbital Injuries

• Eyebrow
• Eyelids
• Lash margin
• Lid canthi
• Lacrimal gland
• Lacrimal ducts
• Globe
Periorbital Injuries

- Careful examination for globe injury
- Lid excursion
- Ophthalmology consult?
- Closure ER vs OR
- Glue?
Ear Injuries

- Highly specialized tissue
- Hard to duplicate
- Risk of cartilage exposure or laceration -> chondritis
- Maximal tissue preservation
- Retain partially avulsed parts
Ear Lacerations

Types of Lacerations

- Skin only
- Exposed cartilage
- Lacerated cartilage
- Partial amputation
- Missing parts
Ear Lacerations

Skin only

• Irrigate
• Skin closure
• 6-0 fast or prolene
Knowledge Check

True or False?

It is never recommended to suture ear cartilage, even when clearly lacerated in the wound bed.
Ear Lacerations

**Skin + Cartilage**
- Irrigate
- Repair cartilage: 5-0 vicryl or monocryl
- Taper needle
- Skin closure
- Antibiotics
- Bolster
Ear Lacerations

Key skin stitch

Key cartilage stitch
Ear Lacerations

Avulsion/Dog Bites

• Irrigation
• Conservative debridement
• Maximal tissue preservation
• Retain partially amputated (attached) parts
Ear Lacerations

Put back together and revise later

Always counsel family about potential need for revision
Lip Lacerations

- Philtrum
- Cupid’s Bow
- Vermilion
- Oral Commissure
- ***Vermilion Border
Lip Lacerations

- Vermilion specialized tissue
- Hard to duplicate
- Area of high motion
- Integral relation to underlying orbicularis muscle
- Some redundancy
- Preserve landmarks
Knowledge Check

True or False?

Only plastic surgeons are qualified to adequately repair a lip laceration involving the vermilion border.
Lip Lacerations

- Superficial
- Line up vermilion border
- GAP → 5-0 vicryl deep
- Skin: 6-0 prolene/fast
- Vermilion: 5-0 chromic
Lip Lacerations

Key vermilion border stitch

Key orbicularis stitch

Key wet-dry vermilion junction stitch
Lip Lacerations

3 weeks later
Lip Lacerations

“Through and Through”
• 3 Layers
  • Oral mucosa
  • Muscle
  • Vermilion
• Irrigate well
  • Tooth injury?
• Repair layers separately
• Mucosa - chromic
Lip Lacerations

• Stick to basics
• Align landmarks
• Make complex wounds simpler
• Repair now, revise later
Animal Bites
Knowledge Check

True or False?

Thorough washing of the wound is the most important step in management of a dog bite injury?
Dog Bite Management

Thorough washing of the wound is the most important step in management of a dog bite injury.
Animal Bites

**Dog Bite Musts**

- Consider potential blood loss
- Thorough exploration of all wounds
- Suspect crush and deep puncture injury
- Wash, wash, wash, wash, wash, wash, wash
  - Antibiotics: *Augmentin*
- Close the wounds, avoid braided suture
- Recognize potential need for late revision
Animal Bites
Animal Bites
Abrasions

- Partial thickness injury to the skin
- Often undertreated
- Can become infected
- Can be associated with permanent scarring, pigmentation changes
- Can benefit from basic care
Abrasions

**Traumatic Tattooing**

- Pigmented foreign particles imbedded into dermis
- Explosive tattooing
- Clean with non-destructive agents
- Large, deep abrasions may require skin grafts
Abrasions

- Viscous lidocaine or LET
- Surgical scrub brush
- Sterile toothbrush
- Side of scalpel blade
- Antibiotic ointment and Adaptic gauze or Xeroform
- Do not ignore embedded particles
Knowledge Check

Which of the following BEST describes a risk factor for wound dehiscence after laceration repair?

A. Infection
B. Wound under tension
C. Hematoma
D. Recurrent trauma
E. Inadequate suturing
F. All of the above
Wound Dehiscence

Risk Factors

• Infection
• Tension
• Hematoma
• Repeat trauma
• Inadequate suturing
  • Too few
  • Too short acting
Wound Dehiscence

- 2 days s/p repair with continuous stitch
- Re-repair?
- Heal secondarily?
Wound Dehiscence

- Higher risk infection
- Scarring worse
- Do not reclose infected wound!
- Clean wound:
  - ≤ 24 hours on the face
  - ≤ 6 hours on trunk/extremity
Wound Dehiscence

- Open wound from shrapnel injury
- 5 days old
- Clean wound
- Antibiotic ointment or Xeroform
- Mepilex foam
- Delayed revision
Wound Care and Scarring

Factors that affect scarring

- The Patient
- The Wound
  - Pattern of injury
  - Mechanism of injury
  - Infection
  - Foreign material
  - Excessive tension
  - Wound dehiscence
- Time
Wound Care and Scarring

My General Advice

• Wait until wound is healed ~ 2 weeks
• Avoid swimming/hot tubs/contact sports
• Sunscreen a must for up to one year
• Massage therapy
• Scar tape
• +/- Scar remedy of choice
• Tincture of time
Wound Care and Scarring

My General Advice

- Wait until wound is healed ~ 2 weeks
- Avoid swimming/hot tubs/contact sports
- Sunscreen a must for up to one year
- Massage therapy
- Scar tape
- +/- Scar remedy of choice
- Tincture of time
Wound Care and Scarring

• ‘Scarless healing’ in 1st trimester only
• Spectrum of scarring
  • fine line
  • hypertrophic scar
  • keloid
Wound Care and Scarring

Instructions to parents:

• Your child will have a scar
• Scars look their worst between 2-8 weeks
• Scars will initially be raised and red
• Takes one year for a scar to mature
• Stay out of the sun
• Options for scar treatment…
Scar Maturation

1 week after injury - unrepaired

2 months

8 months

1 year
Wound Care and Scarring

• Creams and lotions
• Silicone gel sheeting
• Massage
• Pressure therapy
• Steroid injection
• Laser
• Ultrasound
• Surgical revision
Wound Care and Scarring

- Scar massage
- Alters collagen metabolism
- Speeds maturation process
  - Scar flattening
  - Scar fading
- Simple
- Free
- Scar tape camouflages
Wound Care and Scarring

- Scar creams
- Cepalin (Allium Cepa)
  - Onion extract
  - Antibacterial property
- Rub into scars BID-TID
- 6-8 weeks new scars
- 6 months old scars
- $20-35/tube
- Pediatric and SPF formulas
Wound Care and Scarring

- Liquid
- Silicone, cortisone, Vitamin E
- Paint on scar BID
- Dries to thin film
- 2-4 months
- Not recommended <2yrs
- $30/bottle
Wound Care and Scarring

- Scar Gels
- 100% silicone gel
- Rub on scar BID
- Protective film
- 2-3 months
- Can be worn under makeup
- $20-30/tube
Wound Care and Scarring

• Gel-filled capsules
• Penetrates skin well
• Tocopherol thought to affect collagen formation
• Appropriate dosing unknown
• 33% incidence of rash

Vitamin E
In Summary

• Restore normal form and function
• Minimize scarring and optimize primary healing
• Wash, wash, wash, wash, wash
• Debride all nonviable tissue and debris
• Precise approximation of skin edges
• Closure without tension

• Questions? reach out and ask….913-909-7212/aekaye@cmh.edu
Thank You!