

Abstract:

Lacerations are one of the most commonly encountered pediatric problems in the acute care setting. The majority of lacerations in children can be repaired without subspecialty consultation and therefore have become a staple of urgent care medicine. Although most pediatric lacerations are small and heal without sequelae, mismanagement can lead to scarring and infection. Therefore, maintenance of wound care skills by urgent care providers is crucial to providing high-quality wound care. The fundamentals of laceration management are relatively unchanged; however, there have been considerable advances in aspects of wound care that have yet to be adopted because of a failure to relinquish traditional beliefs. The goals of this article are to review the general principles of wound management in children and to dispel a few deep-seated myths.

Keywords:

Laceration; pediatrics; wound; urgent care; wound preparation; wound repair; sutures; staples; steri-strips; tissue adhesives; golden period; after-care; dressing; wound infection; antibiotic prophylaxis

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Pearls in Pediatric Wound Management

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Lacerations are one of the most common injuries in pediatric acute care. Approximately 90 million lacerations were evaluated in emergency departments (EDs) in the United States between 1992 and 2002.¹ However, in today's medical landscape, lacerations not associated with life-threatening injuries have become a staple of urgent care medicine. The majority of lacerations presenting to urgent cares require simple repair and do not necessitate subspecialty or ED referral.^{2,3} Thus, lacerations can be successfully repaired by urgent care providers who maintain wound care skills.

The goals of wound management are simple: control bleeding, avoid infection, and provide the best long-term cosmetic outcome.⁴ Although the fundamentals of wound management are relatively unchanged, there have been considerable advances in management, including procedural analgesia, suture materials, wound adhesive, cosmesis, and postrepair wound care. Despite supportive evidence for evolving techniques, standards of care are inconsistent. The goals of this article are to review the general principles of wound management in children and to dispel a few deep-seated myths in the management of pediatric lacerations.

WOUND ASSESSMENT

Proper wound care begins with a focused history and physical examination to assess for complicating factors that may impact further management. The history should inquire about essentials of the injury including timing, mechanism (ie, blunt, crush or bite injury), and exposures, as well as the patient's medical history and immunization status. During the physical examination, it is important to evaluate for nerve, vascular, or tendon injury and possible foreign bodies. This information will guide not only

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decisions regarding appropriate type of anesthesia and wound closure technique but also the need for possible diagnostic imaging or subspecialty consultation.

Lacerations across joints require specific evaluation for penetration of the joint space. Penetrating intra-articular wounds require urgent orthopedic consultation for thorough irrigation and debridement to prevent serious sequelae including septic arthritis and synovitis. The knee joint is the most common joint to sustain a penetrating injury.⁵ Joint space penetration can be detected by

palpation through the wound, radiography demonstrating air in the joint, or a saline load test. The saline load test is performed by injecting saline or methylene blue (improves visualization of the fluid) into the joint. Extravasation of the saline from the joint into the wound is diagnostic of an open joint injury requiring orthopedic intervention. Although recent studies have questioned the sensitivity of the saline load test in diagnosing intra-articular wounds, it is currently the recommended diagnostic modality in evaluating open joint injuries^{5,6} and can be accomplished by an urgent care or emergency care provider.

The function of tendons that pass near a wound also requires cautious evaluation. Extensor tendons are injured more often than flexor tendons because of their superficial location. Flexor tendon injuries can be associated with neurovascular injury, which must also be considered during evaluation. Complete evaluation involves exploring the tendon through full active range of motion and extending the wound as the injured portion may retract or disappear from view. Partial tendon injuries may require only simple wound care; however, surgical repair is recommended for most complete lacerations and all flexor tendon lacerations.⁶ Prompt recognition and orthopedic consultation for tendon lacerations are crucial to prevent impaired tendon function.^{7,8}

If there is concern for foreign body, consider obtaining a radiograph or ultrasound. Plain radiography is the standard initial screening test for foreign bodies; however, it is not reliable in detecting radiolucent materials like plastic, wood, or pieces of glass less than 2 mm.⁹ It is important to evaluate for glass even if not readily apparent, as injuries caused by glass compose about 13% of traumatic wounds and up to 4.3% of superficial wounds caused by glass have retained foreign bodies even after exploration and visualization.¹⁰⁻¹³

WOUND PREPARATION

Sterile vs Nonsterile Technique

Prior to repairing the wound, thorough preparation is necessary to ensure a clean wound site with low risk

of infection and retained foreign material. Historically, sterile technique was recommended for wound management. However, several studies have questioned the utility of sterile technique in laceration repairs demonstrating that nonsterile techniques, including the use of nonsterile gloves and tap water, do not increase the risk of wound infection.¹⁴⁻¹⁶

Irrigation may be more important than the use of sterile preparatory materials. Specifically, the pressure achieved during wound irrigation is more crucial than the type of irrigation fluid used, with pressures of 5 to 8 psi being sufficient.¹⁷ Singer et al¹⁷ demonstrated that 35- and 65-mL syringes with a 19-gauge needle are effective in performing high-pressure irrigation in the range of 25 to 35 psi. Pierced intravenous bags and plastic bottles should not be used for irrigation because they do not achieve adequate pressures for irrigation.

The use of antiseptic solutions for wound cleansing remains a controversial area in wound management. Commonly used antiseptics for wound cleansing include chlorhexidine, iodine compounds, alcohol, benzalkonium chloride, and hydrogen peroxide. Antiseptics had fallen out of favor with the introduction of systemic antibiotics, but there has been a recent increase in the use of antiseptics with the emergence of antimicrobial resistance. Antiseptics are beneficial in that they inhibit bacterial growth; however, they can also be toxic to wound tissues. There is also little evidence to support clinical benefit from antiseptics, and thus, a standard regimen does not exist for their use in traumatic wounds.¹⁸ Available studies have demonstrated no difference in infection rates when comparing various antiseptic solutions including povidone-iodine and pluronic F-68 (Shur-Clens [ConvaTec, Greensboro, NC]) to isotonic sodium chloride solution.^{19,20} In addition, studies have suggested possible detriment to wound healing with use of antiseptic solutions.²¹ Although there is little evidence to support routine use of antiseptic solutions for traumatic wounds, antiseptics can be beneficial when scrubbing larger surface areas and highly contaminated wounds such as “road rash” to limit local trauma and remove debris. ☒

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