

Soft Tissue Trauma and Scar Revision



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KEYWORDS

- Pediatric facial scar • Scar revision • Pediatric procedural sedation • Topical therapy
- Laser resurfacing • Steroid injection • Tissue expander • Suture material

KEY POINTS

- Scars of the head and neck often have profound physical and psychosocial consequences in children; therefore, treatment should not be delayed in the pediatric population.
- The goal of primary soft tissue trauma of the face is to prevent the need for scar revision by applying proper wound closure techniques.
- The surgeon's armamentarium to improve on the appearance of facial scars should be broad and should generally start from the least to most invasive modalities.
- Treatment planning is an important aspect in children because successful outcomes depend not only on precise surgical technique but also on patient and family cooperation.

INTRODUCTION

Scars of the head and neck region can be physically and psychologically disfiguring. This cannot be emphasized enough in the pediatric population. Wound healing in young children and adolescents is crucial because excessive scarring can lead to low self-esteem and stigmatization.¹ Scars may be the end product of elective or urgent surgery, burns, and trauma. Most superficial facial wounds heal with few long-term sequelae; however, interruption of the reticular dermis likely results in residual scarring.

The ideal scar after complete maturation is narrow, flat, and similar in color to the adjacent skin. Conversely, unfavorable scars are hypertrophic, have wide margins and are misaligned with relaxed skin tension lines.² Patients should be made aware that their facial scars cannot be completely eliminated. Nevertheless, a plastic

surgeon's armamentarium should include a variety of techniques to minimize initial scar formation and treatments in which to improve on unfavorable scars. The successful application of these techniques requires an understanding of their ideal timing and indications.

MANAGEMENT OF PRIMARY SOFT TISSUE INJURY

The ideal management of facial scars is to prevent the need for scar revision in the first place. This begins with appropriate selection of suture material and meticulous handling of the soft tissue to avoid trauma or closure under tension. Surgeons can achieve this by working in an environment in which they are comfortable. Of equal importance is the ability of patients to tolerate the procedure in an emergency department or outpatient setting. When it comes to treating a pediatric facial lesion,

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it may be next to impossible to have a child hold reasonably still to achieve proper repair techniques. Procedural sedation is, therefore, an indispensable tool in this setting.

PROCEDURAL SEDATION

Pediatric procedural sedation refers to the pharmacologic technique of managing a child's pain and anxiety during an uncomfortable procedure.³ Procedures that are attempted in an uncooperative child often require restraints, which create adverse procedure outcomes and undue stress for patients and families.⁴

All children require a presedation assessment, which includes a focused medical history and physical examination to evaluate for risks of adverse events.⁵

Fasting

The amount of time a child should be fasting before procedural sedation continues to be disputed. Two large prospective trials showed no significant difference in adverse events between fasting and nonfasting children.⁶ Several guidelines exist with differing recommendations regarding nothing-by-mouth timing; thus, the risks of immediate sedation must be considered in accordance with the urgency and nature of the procedure.⁷ Potential settings for procedural sedation include emergency departments, subspecialty procedure suites, and physician offices. All locations must have age- and site-appropriate medications and supportive equipment readily available.

Sedatives

A review of the emergency medicine literature illustrates that many medications and cocktails are available to provide pain relief, anxiolysis, or both for a child during procedural sedation.

- Etomidate is a rapid-onset sedative with a short duration of action. It maintains hemodynamic and respiratory stability but reduces intracranial pressure.
- Over the years, ketamine has become commonplace in pediatric emergency departments. The agent creates a dissociative state and provides effective sedation and analgesia. Contraindications include sympathomimetic medical conditions, elevated intracranial pressure, coronary heart disease, and a history of psychosis. Ketamine should not be administered to infants 3 months or younger secondary to risk of respiratory compromise.⁸

- Propofol is a rapid-onset, short-acting agent that offers sedation and antiemetic properties. It has no analgesic properties, however, and therefore warrants coadministration of another agent for pain control. The agent is a potent respiratory depressant and a reversal agent does not yet exist. Thus, it is prudent to monitor the respiratory status of patients under sedation with propofol and provide airway intervention if necessary.⁹
- A sedative combination is available that consists of 1:1 intravenous (IV) ketamine and propofol. Ketamine's sympathomimetic properties act to counter the respiratory depression and hypotension seen with propofol whereas the latter counters ketamine's emetogenic properties.¹⁰ Shah and colleagues¹¹ conducted a randomized trial that suggested greater satisfaction with the sedative combination among patients and providers versus propofol or ketamine alone. Another randomized controlled trial comparing propofol alone with the combined agent found more patient and provider satisfaction but unchanged respiratory depression.¹² Another group found that the propofol and ketamine combination provided more consistent sedation depth than propofol alone.¹³

Administration of Sedation

Intranasal administration of sedative agents offers more rapid onset of action compared with IV or intramuscular administration, with less discomfort.

Intranasal midazolam can provide anxiolysis during simple procedures, including incision and drainage and minor laceration repair.¹⁴

Inhaled nitrous oxide (N₂O) is another option for pediatric procedural sedation. One prospective randomized study compared inhaled N₂O and IV ketamine during laceration repair in children.¹⁵ The ketamine group had higher initial pain scores and more emesis than the N₂O group; however, results may be biased secondary to IV placement in the ketamine group alone. A large prospective, observational study showed a good safety profile for sedation with N₂O administered at 70% concentration by nasal mask for procedures of fewer than 15 minutes in children.¹⁶

SUTURE MATERIAL

Traumatic lacerations are among the most common reasons that children are seen in the emergency medical setting. Pediatric wounds must be closed with special attention to avoid excess tension. Skin elasticity is inversely proportional

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