Current Management of Maxillofacial Burn

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Abstract

Maxillofacial burn is a frequent anatomic site to incur thermal injuries, and the treatment modalities are ones that oral and maxillofacial surgeons use routinely with other surgical procedures. This article reviews the pathophysiology, current therapy of management and role of oral and maxillofacial surgeon in burn management of maxillofacial burn.

INTRODUCTION

Burns can be thermal, radiation, chemical, or electrical. The most common causes are child play fires, scalding water, curlers, ovens/ranges, microwaves, fire works, electric outlets, and various chemicals. Legislation, health promotion and appliance design have reduced the incidence of burns, with regulations regarding flame retardant clothes and furniture, the promotion of smoke alarms, the design of cookers and gas fires, the almost universal use of cordlers kettles, and the education of parents to keep their hot water thermostat to 60°C all playing their part.[1] The management of the major burn injury represents a significant challenge to every member at the burn team burn doctors, anesthetists, oral and maxillofacial surgeons, ward and theatre nurses, physiotherapists occupational therapists, dietitians, bacteriologists physicians, psychiatrists, psychologists and the many ancillary staff whose cleaning and supply services are vital to the successful running of burns unit.[2]

THE PATHO-PHYSIOLOGY OF BURNS

Burns cause damage in number of different way, but before the most common organ affected the skin. It occurs when these structures absorb more heat than their capacity to dissipate. Children and the elderly, by virtue of their thinner skin, sustain more severe burns at lower temperatures and in less time than a young adult. Exposure for just 3 seconds to water at 140°F can result in full thickness or third degree burn. At temperatures between 44°C and 51°C, the rate of cellular destruction doubles with each degree of increase in temperature.[3]

DEGREE OF BURN:

1. First degree burn: It can be caused by sun burn, scaled or flash flame. The appearance is dry and without blisters with a pink color that is usually painful. Healing occurs over 5 to 10 days with pealing when hair follicle and sweat glands are not destroyed. Usually, no permanent scar occurs but the tissue may discolor.

2. Second degree burn : It can be caused by contact with hot liquids or solids, flash flame, or chemicals. The appearance is hypermic, but may be pale, moist with blisters, and is painful. A superficial partial thickness burn heals in 10 to 14 days and no grafting is needed. The skin is thin, hairless, and very delicate. A deeper partial thickness burns may take more than 30 days to heal and can convert to full thickness injury or the deeper partial thickness burn usually results in hypertrophic scarring.

3. Third degree burn: It can be caused by contact with hot liquids/solids, flames, chemicals or electricity. The surface is dry and leathery until removed and charred blood vessels are visible under the skin. The deeper wound may appear while waxy, pearly, dark khaki, mahogany, or charred. The patient may have no cutaneous pain. These wounds will need grafting and take months to heal.

EFFECT OF BURN ON MAXILLOFACIAL ANATOMY

EYE

Anatomic sites need to be addressed as part of the whole injury, but also individually. With eye injuries, early closure

and/or grafting must be considered. The eyelid skin is thinnest on the face, and early contracture can lead to exposure keratitis and rapidly destroy vision. An ophthalmology consult should be obtained because corneal abrasion is the most common injury. Protection of cornea with ointment or early tarsorrhaphies may be initially indicated. Ectropion may develop if secondary healing occurs with scarring or if tension occurs with primary closure. A graft of sufficient thickness should be used to help prevent lid contractures and globe exposure[5]. Multiple surgical reconstructions may be anticipated until adequate function is achieved.

Mouth: Injuries around the mouth can be cause considerable deformities. Microstomia can be limited with the use of internal or external mouth spreaders upper and lower lip grafts can be placed to reconstruct the vermilion. Mucosal advancement flaps can also be used. Secondary reconstruction may be necessary, including scar releasing procedures.

Nasal: The skin is often preserved over the lower portion where the skin is thicker and the sebaceous glands are deeper. Flattening of the alar region is often encountered secondary to contracture.[4]

Ear: Ear injuries may need local debridement or resection. If a choridritis occurs, it can be managed by removal of the affected cartilage. Attempts to salvage visible cartrilage may be made by burying in soft tissue pockets and later performing secondary graft reconstruction. Some patients may require local regional temporalis facial flaps for coverage. Pressure should be kept off the pinna with a doughnut dressing to reduce the possibility of pressure necrosis.[5]

Tongue: It may produce coagulation necrosis of superficial tissue that appears whitish. In some cases, there may be frank ulceration and stripping of mucosa. Red area is tender to painful; it may blanch on pressure and there is bleeding on manipulation. It can be manage by systemic analgesics and topical hydrocarbon in emollient base.[6]

Lip: There is persistent swelling and redness. It occurs due to prolonged contact of ice cream and other frozen confectionaries or very cold metal, glass object, with child's lip.[7]

CURRENT THERAPY FOR MANAGEMENT OF BURN

CARBON DIOXIDE, CARBON MONOXIDE AND OTHER FOREIGN BODIES

It must be determined if gases inhalation occurred. Signs suggesting inhalation injury are as follows: history of confinement at a burning building, exposure to an explosion, decreased level of consciousness, carbon deposits around the mouth or oropharynx, coughing, signed facial hair and respiratory distress. Assessment for carbon monoxide (CO) poising is imperative because this is most common cause of death in fires. The signs and symptoms of CO poising correlate with concentration. The symptoms is mild, throbbing headache, excitement, reckless behaviour, nausea, vomiting and fainting in exertion are observed. If the CO level rises above 50 percent, coma, convulsions or death may occur. One way observe the “cherry red” mucous membrane with increased CO, but this is not an absolute sign. The definitive test for CO poising is a spectrophotometric determination. Treatment is administration of 100 percent O2. If upper airway injuries are expected, one must consider the need for a controlled airway. Edema may increase over the first 24 to 36 hours and nasotracheal intubation or tracheostomy may need to be performed. The status of immunization must be noted and tetanus toxoid is not needed if the patient has been immunized within the past 5 years. Estimation of total surface area burned to helpful for fluid replacement. Wallace's rule of 9 is a reliable method for estimating the total body surface area burnt.

Management of first degree and minor second degree consists of suntan lotions, topical anesthetic, anti-inflammatory agents and oral antihistamines. Management of second degree of 15% or less or third degree of less than 2% of the body surface may be treated on an outpatient basis if all other circumstances are favorable.[9] Second degree and third degree burns of greater than 15 percent should be treated as in patients because plasma loss will be great enough to cause hypovolemic shock if not prevented by intravenous infusion. Burn greater than 30 percent should be treated at burn facility. Fluid replacement is estimated by the parkland formula.[10] To avoid overhydration and pulmonary edema, patients with inhalation injury should have their urinary output monitored closely. Deep second degree and third degree burns require surgical intervention unless the wound is small enough to heal by contracture. Initially, the wound is treated with either the exposure method or closed method.[9] Topical antimicrobial agents such as mafenide,

silver sulfadiazine and 0.5 percent silver nitrate solution may be used to limit proliferation of bacteria. Systemic antibiotics may not reach the wound well and are not routinely used. Once patient is diagnosed with deep second degree or third degree injury, definite treatment must be considered. Numerous methods are available for wound reconstruction including; healing by granulation, freeskin grafts, primary closure, and local, regional or distant skin flaps.[11]

For most oral and maxillofacial injuries, a sequential excision consisting of removing thin layers as injured tissue is performed until viable tissue is identified. A facial excision consists of removal of all tissue to the depth of underling muscle. This may be performed with a surgical blade or dermatome. After removal of non viable tissue, a graft must be placed and autogenous skin grafts are accepted as the treatment of choice. Donor sights of good quality of for the face are the scalp, neck, supraclavicular region, and inner thigh / arm. The autograph thickness can be variable, but a graft of 0.010 to 0.0025 inches in sheets seems to give good cosmetic and functional results.[12] Currently, a skin substitute called interga is available. It is a bilayer of pseudodermis with an overlying silastic cover. It contains no living components but supplies a protective covering and pliable scaffold onto which the patient's own skin cells “regenerate” the lower dermal layer that was destroyed by burn[13]. Another material much like integra is alloderm. This material skin is produced by removing from cadaver skin all cell components that cause rejection. Similar to derm provides a scaffold for new derm's to form.[14] Other techniques to limit scar contracture are exercise, traction, oral appliances, nasal vestibule inserts, silicone sheeting and steriod injections.

CONCLUSION

The oral maxillofacial surgeon may not treat burn routinely and understanding the principles of the injury and possible treatment options should be in armamentarium of each surgeon. It must be remembered that burn injuries may take the skills of multiple specialties in burn center, and long term treatment may be staged. The consequences of maxillofacial burns can be devastating to the patient and acceptable results challenging to the surgeon.

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