Lawn Mower Injuries in the Pediatric Population

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The incidence of childhood lawn mower injuries occur far too frequently. These events can occur year-round, but most often in the warmer months. Children may sustain these injuries in several ways. They may be injured as they are riding with the operator, playing near the mower, operating the machine themselves, by entering into the area unknown to the operator or by being struck by projectiles exiting from the mower. Injuries caused by lawn mowers are associated with severe mutilation and long-term disability. Often patients must endure painful reconstructive operations for months, sometimes years, to restore form and function.

The treatment of these injuries requires a multidisciplinary approach. The team approach may involve trauma, plastic, orthopedic, and podiatric surgeons, who may be required to perform surgical treatment and reconstruction. Physical and occupational therapists, nursing and social services work together to provide coordinated care for the treatment and rehabilitation following the injury. The patient and the family members must be assessed to determine how they are managing the crisis. Enlisting the aid of a social worker, which is trained in crisis intervention, can assist in identifying the family's needs (Dinman, 1998).

The type of mower has little consequence when discussing the wounding capabilities of the machine. The average blade is 26-in (66.04 cm). long and weighs 3.5 pounds (1.59 kg). The wounding capability of this blade moving at the standard 3000 rpm is equivalent to dropping a 211-pound (95.71 kg) object from the height of 100 feet (30.48 m). This is three times the muzzle energy of a 0.357 Magnum pistol (Goldsmith & Massa, 2007).

EPIDEMIOLOGY

In a study by Vollman and Smith, between 1990 and 2004, there were an estimated 140,700 lawnmower-related injuries to children. They were 20 years or younger and treated in hospital emergency departments in the United States. The mean age was 10.7 years (SD 6.0) and 78% were boys. The leading type of injury sustained was a laceration (41.2%) followed by soft-tissue injury (21.4%), burn (15.5%), and fracture (10.3%). The most common body region injured was hand/finger (34.6%), followed by lower extremity (18.9%) and foot/toe (17.7%). Injuries to the eyeball/face occurred at 10.6% and upper extremities at 7.4%. Burns accounted for 34.5% of injuries to the hand/finger compared with 5.5% to other body regions. Of the amputation injuries, 97% occurred to the foot/toe (49.5%) and hand/finger (47.5%) compared with 3% to other body regions. In the burn statistic, 41.8% of the burn injuries occurred to children who were younger than 5 years compared with 6.5% of injuries to children who were older than 5 years. Foreign object injuries accounted for 4.8% of injuries among children who were 12 years or older compared with 1.6% of injuries to children who were younger than 12 years (Vollman & Smith, 2006).

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The author has no conflict of interest.

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DOI: 10.1097/PSN.0b013e3182a3e395

PSYCHOLOGICAL ASPECTS

The lawn mower injury is a sudden, and unexpected event, which can frequently make the family of the trauma victim feel helpless and vulnerable. They often do not know what to expect from the situation and how to proceed with this sometimes-major lifestyle event. The responses by the family members to the trauma will depend upon previously learned behaviors and prior experiences with life-threatening events. They may exhibit various coping mechanisms such as loss, hopelessness, anger, frustration, resentment, guilt, anxiety, lifestyle and role changes, financial obligations, and potentially a change in the relationship with the patient. The nurse has the responsibility to assess the patient, as well as the family members, to determine how they are managing the crisis (Dinman, 1998).

Nursing personnel should be supportive and not judgmental during their interactions with the family and child. Emotions between parents may be verbally or nonverbally expressed and can consist of anger, resentment, and guilt. During the emergency phase of treatment, anxiety and stress can cause poor retention of new information by the family caregivers. So, it is required to provide simple explanations for care, define medical terms in lay language, and repeat the significance of care. The parent may have more difficulty coping emotionally if (*a*) the injury caused an amputation, (*b*) a parent of family member was directly responsible for the accident, (*c*) the injury has compromised the child's general health, or (*d*) a prosthesis will be needed for life (Martin, 1990).

Stressors on the injured/hospitalized child include separation from the primary caregiver, loss of function and control, altered body image, and pain. These stressors will be different depending on the developmental stages of the child (Hotta, 2007). The child should be given an opportunity to voice feelings about the injury and expected outcome during his or her nursing care and treatments. Temporary regression in developmental stages is common following a traumatic injury to a child. Child life specialists and psychologists may be helpful in this phase to allow the child the opportunity to role play and explore his or her feelings through guided interventions.

ACUTE TREATMENT AND RECONSTRUCTION

In the emergent care of the child, assessment of the child's airway, breathing, and circulation, including blood loss and hydration, is performed. It is essential to determine the following: time of last food/fluid intake; allergies and reactions to allergens; ongoing medical problems; how amputated parts such as skin, digits, or an extremity were handled during the transfer and where they are located; and if one parent is present, whether the second parent has been notified (Martin, 1990).

Prompt treatment of the injury consists of parenteral antibiotics, excision of nonviable tissue, copious irrigation, repair of vascular trauma, and stabilization of osseous fractures. Often the injury involves exposed tendon, bone, or joints that can complicate reconstruction because of limited availability of local soft tissue and the risk of infection and/or desiccation (Greenhagen, Raspovic, Crim, Ryan, & Gruen, 2013). If the injury involves the foot, the functional demands placed on feet and the distal relationship of the feet from the rest of the body can prove to be difficult in the reconstructive process (Clark & Sherman, 1993).

Reconstructive options can range from the simple—as in primary closure or healing by secondary intention, or split-thickness skin grafting—to the more complex local and microvascular flaps, or amputation if the injury proves to be too great for reconstruction. For lower extremity injuries, the medial gastrocnemius can be utilized for coverage for the knee and upper third of the leg. The soleus provides coverage for the middle third of the leg and microvascular flaps are used for large lower third leg defects. The best are local flaps when possible, because as Gillies wrote, "the next best skin is the next nearest skin" (Elshahat, 2010). When possible, the weight-bearing surface of the foot should be covered with local vascularized sensate flaps.

Small vessels in children younger than 2 years may prohibit microvascular surgery. Older children with larger vessels are often better candidates for microvascular flaps than adults. Pediatric patients also resist ulceration of foot skin grafts, tolerate prolonged immobilization, and are rehabilitated more readily than adults (Horowitz, Nichter, Kenney, & Morgan, 1985).

The care following surgery is based upon the surgery performed. If the extremity is replanted, postoperative care and assessment will center upon circulation and venous return. Assessment for infection will also be critical because the wound was contaminated from the initial injury. Nursing care should include the family caregivers where the nurse can be actively listening, restating phrases voiced by the caregiver, allowing time to talk about the injury, and required care. A nurse should accompany the physician when he/she talks to the family as an advocate for the child and family. The nurse can answer questions or reinforce the plan of treatment.

PREVENTION

In an ideal world, lawn mower injuries would not occur. The Steer Children Clear of Lawn Mower Injuries (American Academy of Pediatrics, 2012) campaign offers these prevention strategies:

- Children should be at least 12 years old before they operate any lawn mower, and at least 16 years old for a ride-on mower.
- Children should never be passengers on ride-on mowers.
- Always wear sturdy shoes while mowing, not sandals or bare feet.
- Young children should be at a safe distance from the area you are mowing.
- Pick up stones, toys, and debris from the lawn to prevent injuries from flying objects.
- Use a mower with a control that stops it from moving forward if the handle is released.
- Never pull backward or mow in reverse unless absolutely necessary being careful to look for others behind when you do.
- Always wear eye and hearing protection.

CONCLUSION

Even with the best prevention practices in place, lawn mower injuries will continue to occur, causing the child and family to endure a sometimes lengthy, complex recovery. The plastic surgery nurse's involvement as a member of the multidisciplinary team will range from assessment of the patient and family to identify their needs, education of care during the recovery, and reconstruction process. They also act as an advocate for the patient and family as they negotiate the health care system.

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