

Developing a Standard of Care for Halo Vest and Pin Site Care Including Patient and Family Education: A Collaborative Approach Among Three Greater Toronto Area Teaching Hospitals



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ABSTRACT

Caring for an individual with a halo vest can be a frustrating and anxiety-provoking experience for healthcare professionals, the patient, and their families. Physicians or trained nurses apply halo vests in various situations in which cervical spine stabilization is required for an extended period. This device can be used as a first-line treatment in the management of nonoperative cervical trauma, that is, fractures, or placed following cervical surgery. Standardizing the application techniques and care associated with the halo vest, pin site care, and day-to-day activities of daily living will increase the comfort and self-confidence of healthcare professionals and the patient and family members in the provision of care. A collaborative approach among three greater Toronto area teaching hospitals aided in the development of standardizing care and patient educational materials for patients with halo vests.

The halo brace is a device that is used to immobilize the head and neck following a cervical fracture or postoperatively to allow bone healing. The system consists of a ring that is attached to the outer table of the skull with four pins and supporting rods attached to a vest (Botte, Byrne, Abrams, & Garfin, 1996). In turn, this allows the patient to be mobile, whether it is independent or assisted ambulation or movement, and reduces complications associated with immobility. However, this generally creates significant anxiety and frustration for patients and their families because it requires significant adjustments to the individual's lifestyle and activities of daily living (Olson & Ustanko, 1990). Given that most patients are discharged back into the community, halo vest care standardization is essential for optimizing care to reduce patient anxiety, frustrations, and complications.

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Literature Review

A review of the nursing literature surrounding the application, care, and management of halo vests and pin sites is limited and outdated (Botte et al., 1996; Marr & Edmonds, 1992; Marr & Reid, 1993; North, North, & Lee, 1992; Olson & Ustanko, 1990; Olson, 1996; Reid, 1993). For example, there is no clear consensus regarding pin site care for halo vests, that is, time frequency and cleaning solutions, or any conclusive evidence to support use of any one method. Most patients require specific teaching regarding self-care, activities of daily living, coping mechanisms, and activity limitations. Given this, there was a strong need to develop standardized methods of care for nurses involved with halo crown application, halo vest application, halo pin and vest care, and patient and family educational materials.

In an attempt to standardize the care with halo vests and associated patient education, three greater Toronto area hospitals began a collaborative process in this development. A review of each hospital's policies, procedures, and protocols was undertaken. Gaps and similarities with respect to care of these patients were noted, and subsequent standardized guidelines were developed. In addition, comments from patients and nurses identified the need for this information.

Application

Halo traction is typically used for stabilizing cervical spine fractures and preoperatively to reduce spinal

Standardization of halo vest and pin care is a key component in providing optimal patient care once patients leave the acute care setting.

misalignment. Once proper alignment has been established, a halo vest is often applied to provide ongoing immobilization of the cervical spine. Treatment time with the halo vest can vary but is usually up to 12 weeks in duration. Components of the brace include the halo ring, skull pins, anterior and posterior vest, “sheepskin” type vest lining, four upright bars, and two transverse bars. For application, torquing caps or torque wrench, positioning pads, and a “spoon” are required. Contraindications for the application of the halo crown include skull fractures, chest trauma, obesity, and advanced age.

Crown

Prior to application, analgesics along with topical anesthetic to assist with patient anxiety and pain management should be considered. The patient is carefully log rolled onto the “spoon,” which helps support the occiput and lies flat under the patient’s spine. Three positioning pads (suction cups) are inserted through the crown, resting one between the patient’s eye brows and one on each side of the crown. These are used to stabilize the crown on the patient’s head while the clinician assesses pin placement, making it possible for one individual to apply the halo crown. The pins are positioned and then inserted approximately 1 mm into the outer table of the skull through direct puncture. Optimal placement is essential because this will help to decrease future complications. Two anterior pins are placed in the outer two thirds region of the eyebrows, approximately 1 cm above the eyebrows, with no more than 1 cm between the halo crown and the patient’s forehead. Two posterior pins are placed just behind the ears below the equator of the skull. These areas are infiltrated with local anesthetic prior to pin insertion. Positioning of the crown should be done carefully so as not to have any part of it touching the top of the head or ears. A careful observation during pin insertion is necessary to help prevent misalignment of the crown. Opposing pins are tightened two turns at a time until the torquing caps break off; indicating that 8 lb/in.² has been attained. Halo pins are retorqued to 6–8 lb/in.² within the first 24–48 hours after halo application (DePuy, 2003).

Vest Application

Once the physician is satisfied with spine alignment, the patient will be placed into the vest component of the apparatus. The upright bars will need to be attached to the anterior and posterior portions of the vest. The patient is then log rolled, and the “spoon” is removed. The posterior portion of the vest is placed under the patient and gently centered. The upper portion of the vest should match the superior aspect of the scapulae, and the opening in the posterior vest should be in line with the spine. The transverse bars are then placed into the posterior joints, ensuring that the bolts are on the outside and access to the posterior pins is not blocked. The sternal notch should be exposed about 2 in. above the upper edge of the anterior vest. Slide the thoracic bands through each guide on the anterior vest, being careful not to restrict the patient’s breathing, and then lock into place. Attach shoulder straps. Position patient’s head and cervical spine into correct placement and tighten all clamps. Secure the halo wrench onto front of the vest or upright bars (DePuy, 2003).

Adjustments

Upon completion of the halo vest application, a lateral cervical spine x-ray is required to ensure proper alignment and positioning. In the event that the patient complains of difficulty swallowing or of having pressure on the top of his or her head, that is, a “scrunched” feeling, these symptoms could indicate that the vest may have been applied too tightly, too high, or too low. Adjustments to improve patient comfort may be necessary. Adjustments to improve alignment will be based on the results of the cervical spine x-rays.

Complications

Halo vest and crown fixation are generally quite effective; however, complications may occur (Botte et al., 1996; van Middendorp, Sloof, Nellestein, & Oner, 2009; Vertullo, Duke, & Askin, 1997). The halo vest brace is associated with complications such as pin site infections, pin site loosening or dislodgement, skin breakdown, swallowing problems, and dural tears. Complications are typically minor in nature and easily treated.

Pin Loosening

Pin loosening is one of the most common complications seen. The reason for pin loosening is thought to be resorption of the bone at the tip of the pin. Pin loosening may cause instability and possible infection. It occurs in 36%–60% of patients with a halo vest. In the absence of infection, halo pins can be retightened to 4–6 lb/in.². One needs to be cognizant

of meeting resistance within the first few turns of the pin. If no resistance is met, the pin(s) should be removed and replaced. The old pin should not be removed until the new pin is rigidly in place in an adjacent position. Also, if a pin frequently requires tightening, the clinician should consider removing the pin and inserting a new one into a different location. This will ensure that the pin does not penetrate the skull.

Pin Site Infection

Pin site infection is another potential complication. It occurs in 20% of patients with a halo vest. Diligent pin site care should be done. If redness and drainage continue to occur at the pin site, cultures should be taken. Appropriate oral antibiotics should be started if the culture result is positive (Bono, Garfin, Einhorn, & Tornetta, 2004). If cellulitis or continuous infection occurs, the pin may need to be replaced in a new site.

Ring Migration and Loss of Immobilization

Loss of immobilization or ring migration occurs in about 10%–13% of patients. This should be suspected in patients who complain of neck pain, ability to move their neck, and a change in fit of the vest or position of the ring. Ring migration can occur because of loose pins not being tightened. The pins may travel or track upward on the individual's skull, leaving open wounds under the pins. Management at this point would include immobilization of the cervical spine with a hard collar. Radiological imaging would be obtained to assess for changes in spinal alignment; reapplication of the halo device may likely be required.

Skin Breakdown and Pressure Sores

Insufficient padding, inappropriate vest size, or poor application can result in skin breakdown and resultant pressure sores. This may occur in up to 4%–11% of patients. Pressure sores usually develop underneath the vest because of the pressure against a bony prominence. The scapula and along one's spine are common places for skin breakdown. This can be prevented by adequate padding, turning, and repositioning. In addition, daily care of the vest should include meticulous skin care and assessment to assess for early signs of skin irritation. Refitting of the vest may be required to minimize pressure areas.

Dysphagia

Exaggerated extension positioning of the head and neck can result in swallowing difficulties (Ertekin et al., 2001; Morishima, Ohta, & Miura, 2005; Olson,

1990). Adjustment of the halo by flexion of cervical spine while monitoring reduction of the cervical spine may help in resolving dysphagia. A referral with a speech language pathologist may be helpful in assessing and resolving the swallowing problem.

Dural Punctures

A dural puncture is a rare occurrence and usually is a result of trauma, such as a fall or blow to the halo device itself. It can be a potentially serious problem. The patient may complain of headache, malaise, visual changes, and cerebrospinal fluid leak (Bono et al., 2004). Skull fracture may occur as evidenced by radiological films. Treatment of this problem will include pin removal and replacement, along with antibiotic treatment. Dural tears can usually heal within 4–5 days (Bono et al. 2004). Surgical intervention may be required if healing does not occur.

General Guidelines for Halo Pin and Vest Care

Application of the halo crown, retorquing of the halo pins, adjustments of the vest, and removal of the crown must be performed by a physician or delegate trained in the procedures. Halo pins are to be retorqued to 6–8 lb/in.² by the physician or delegate 24–36 hours following ring or crown application. Follow-up retorquing should be done at 4–6 lb/in.² every 4–6 weeks or as needed. One should always remain cognizant of the potential for a dural puncture with retorquing a pin multiple times.

Pin Site Care

The purpose of pin site care is to keep the pin sites clean and prevent pin site infections (Marr & Reid, 1993). Preferences regarding cleaning solutions for pin site care and removal of crusts that may form around the pins vary between physicians and institutions. Specific protocols and procedures should be sought out prior to providing pin care.

Among the three hospitals involved in the standardization of care, the following protocol was developed. Visually assess the pin sites frequently. Pin site care should be provided once per shift in hospital and daily when home. If crusting or drainage is present, pin site care should be increased in frequency to three times per day or as needed. The pin sites are cleansed using a clean cotton tip applicator or gauze soaked with normal saline. A clean cotton tip applicator or gauze should be used for each individual pin site. If crusting is present, wrap the pin site with normal-saline-soaked gauze for 15–20 minutes and then remove. Using a gentle rolling motion, the crust can then be removed with a cotton-tipped applicator

that has been soaked in normal saline. Avoid ointments and solutions such as peroxide and chlorhexidine because they can be irritating to the skin and potentially cause skin breakdown.

Halo Vest Care

Washing under the vest must be done with the patient lying down (Marr & Reid, 1993). Assist turning the patient onto his or her side and open the vest strap at the waist. Open the vest and place a towel inside to protect the lining. Assess skin for redness or areas of potential skin breakdown. This is very important, especially for those with impaired sensation. Wash the patient's chest and back with soap and water. Do not use lotions or powders underneath the vest. Dry the skin thoroughly and resecure buckle straps. Turn patient onto opposite side and repeat steps. A cotton pillowcase or undershirt can be worn or placed under the vest for comfort and absorption of perspiration. This should be changed regularly.

Hair Washing

The patient's hair should be shampooed regularly. Place the patient supine in bed, placing a towel or plastic bag along the back and shoulders of the halo vest to protect the lining from getting wet. The halo crown, pins, and bars can all safely get wet. Have a basin of water, a large empty garbage can, a cup, and shampoo ready for use. Remove the headboard and gently bring the patient's head out over the top of the mattress so that it is suspended beyond the mattress; shoulders should remain on mattress. The halo system will support the head and neck safely (North, North & Lee, 1992). Place garbage can under the patient's head to catch the water. Wet hair, wash, and rinse as usual.

Other Nursing Assessments

In addition to the standard halo pin and vest care, nursing assessment of the patient's underlying medical conditions is essential. Routine spinal cord assessment of both sensory and motor functioning and bowel and bladder function is important. Particular attention should be made with the patient's ability to swallow. The halo device can alter the normal swallowing mechanisms, and the patient may present with clinical symptoms of dysphagia (Stambolis et al., 2003). Any neurological changes or deterioration should be reported to the attending physician for further assessment and evaluation.

Red Flags

Despite meticulous pin care and regular pin tightening, pin site complications can develop. Signs that the halo pins may be loose can include redness, swelling, discharge and drainage, tracking (an open

area where skin has pulled away from the pin), or pain at the site.

Patient and Family Education

Patients and families require information and guidance about the care of their halo when being discharged back into the community (Olson & Ustanko, 1990). Written information along with specific discharge teaching is crucial in helping to prevent complications. Given the lack of updated information in the literature, a patient education booklet was developed that included various aspects of day-to-day living and key points of consideration when living with a halo. Key areas that were addressed in detail included having regular assessments by the medical doctor and team, knowing various parts of the halo vest, skin care, bathing, dressing, sleeping, transportation, walking, grocery shopping, reading, and sexual activity.

Key aspects of discharge teaching would include the importance of vigilant skin care, the avoidance of bending or heavy lifting, no driving because it is illegal with a halo vest, and alterations that may be necessary to clothing while in the halo vest. The best form of exercise while in the halo vest would be walking, and all other activities should be avoided until the vest is removed.

Cardiopulmonary Resuscitation

Fortunately, cardiac resuscitation is rarely required in halo patients. Should the need arise to perform chest compressions, the patient must be supine on the posterior portion of the halo vest. The anterior portion of the halo vest will need to be removed. Using the halo wrench (which one will find secured to the vest), loosen the two bolts through the red emergency washers on the anterior portion of the vest. Release the two straps and rotate the anterior portion of the vest away from the body to expose the sternum. Cardiopulmonary resuscitation can then be performed as necessary whereby the posterior portion of the vest substitutes as the "crash board" (Bremer Medical Inc., 1990).

Conclusion

Because the length of time individuals are treated in a halo can vary, the impact a halo system can have on day-to-day life activities is not surprising. It is important that resources be available that help to support the patient and family in finding normalcy in life. Becoming familiar with concerns and needs of these individuals will help nurses to provide needed discharge teaching plans and help to address worry and apprehension that may arise once home.

Further research into the perceived impact on quality of life of the individual living with a halo vest would provide rich data into specific teaching and supports that may be required to assist with coping mechanisms. Also, given that it was an adult patient population at these three hospitals, there may be other differences with respect to care and needs of the pediatric population that should be examined in more detail.

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