

# Ballert

# ORTHOPEDIC

## ORTHOTICS AND PROSTHETICS



### THE HALO SYSTEM PART II Problems with & Solutions to Halo Fixation

*By Gene Bernardoni, CO*



#### PROBLEMS WITH HALO FIXATION

So far in this series of articles about the halo orthosis I have discussed the history, the major components of halos, and the fitting of the halo to the patient. In this month's portion of the article I will discuss some of the problems that may accompany the patient's use of the halo.

The halo is almost always used on patients who have undergone significant surgical procedures or have experienced severe trauma. This orthosis is considered to provide the highest degree of stabilization to the cervical spine. So, while the orthosis is cumbersome and can be uncomfortable, it allows the patient to remain ambulatory in cases where cervical traction, in bed, might otherwise prove necessary. Even with its major benefits the halo is not without its problems. Most of the problems can be mini-

mized or eliminated by a trained and experienced orthotist and a cooperative patient. The orthotist can prevent many of the problems by careful application of the orthosis. Then, the orthotists must educate the patient in the use and care of his halo and must inform the patient of side effects and problem signs. The attendant discomforts can be minimized with regular check-ups and good communication.

#### PIN SITE PENETRATION

When a halo application is prescribed, a thorough understanding of the patient's cervical and cranial injuries needs to be ascertained. Checking with the attending physician and the patient's chart for information regarding any radiological studies, method of injury, and both cervical or cranial fracture sites is imperative. The orthotist should also visually examine the patient's skull and palpate the planned

*(Continued on page 2)*

#### Ballert Locations

2434 W Peterson Ave.  
Chicago, IL 60659  
(773) 878-2445  
Fax: (773) 508-6699

125 E. Lake Cook Road, Ste 221  
Buffalo Grove, IL 60689  
(847) 459-9006  
Fax: (847) 459-9182

1250 N. Mill Street, Ste. 106  
Naperville, IL 60563  
(630) 637-9540  
Fax: (630) 637-9542

5659 S. Cottage Grove, Unit B  
Chicago, IL 60637  
(773) 493-2445  
Fax: (773) 493-5282

233 E. Erie St., Ste. 200  
Chicago, IL 60611  
(312) 787-4400  
Fax: (312) 787-4402

1725 W. Harrison Ave., Ste. 960  
Chicago, IL 60612  
(312) 563-2795  
Fax: (312) 563-2850

139-141 Front Street  
Wood Dale, IL 60191  
(630) 694-9305  
Fax: (630) 694-9360

(Continued from page 1)

pin sites to determine their integrity. Lacerations or bleeding, especially in the area of future pin sites should be questioned, and a determination must be made to identify fractures beneath those lacerations. It is also important to get a history of any previous craniotomies. Fracture or surgical sites should be avoided when choosing pin sites. Although an experienced orthotist can “feel” a lack of resistance and immediately realize there is a question of skull integrity, it is probably wise to set torque drivers at about 4 in/lbs. to start the application when in doubt.

### **PIN LOOSENING**

One of the most common problems is pin loosening. In order to avoid this problem the orthotist should re-torque each pin to 8 in/lbs., 30 minutes after the crown application and again 24 hours after application. The orthotist will then check after 2 weeks of halo wear and will re-torque each pin to 8 in/lbs.

If the orthotist finds that the pin is continually loose and/or that more than 2 turns are required to restore torque to the pin he should suspect bone erosion and consult with the doctor about placing a new pin at an adjacent site and removing the old pin.

When doing adjustments, a common mistake by an inexperienced person would be to forget to loosen the locknut before attempting to apply the torque driver. This would get a reading from the torque driver indicating full desired torque, but would not be measuring pin to skull torque, but pin to ring torque. In the second instance no torque would be applied to the skull at all. The same situation will occur if the pin has reached the end of its treads and torque driver would measure pin to crown torque and not pin to skull torque.

### **PIN MIGRATION**

Of course prevention of pin migration is one of the orthotist’s most important goals. Much of the prevention occurs at the application of the halo. Pin migration can be eliminated by making sure that the pins are placed below the equator of the skull at application. A distance of more than 2 cm between the crown and the skull at pin sites can allow pin flexing and increase the risk of it dislodging. Certain patients offer a higher risk of pins dislodging or pin migration. Patients with a strongly sloping forehead, or patients with large trapezius muscle formations (such as weight lifters) and larger people over 6’2” require special attention. With these patients, it is wise to add an extra pin behind each ear. With very large in-

dividuals (i.e. those over 6’5” in height) it is also wise to add a second lateral bar just above the shoulder to increase the AP rigidity of the system.

### **INFECTION AT PIN SITES**

Another problem is infection or irritation around the pin sites. If excess redness or drainage persists around a pin site that is given normal pin care and fails to respond to the use of topical or oral antibiotic therapy (See Fig.1), a new pin at an adjacent site



Fig. 1: Pin Site Hygiene

should be considered, with removal of the old pin. The old pin site can then be treated directly and allowed to heal.

### **SWALLOWING PROBLEMS**

In some cases the patient may develop trouble in swallowing. This may sometimes be due to swelling as the result of the surgical procedure. However, it can sometimes be attrib-

(Continued on page 3)

(Continued from page 2)

uted to cervical extension. If this is the suspected cause, the orthotist should reduce cervical extension as much as possible without compromising cervical pathology. The orthotist should ask the patient as he reduces extension if swallowing is less difficult. Too properly assess, ask the patient to swallow a bit of water while seated.

### PATIENT FALLS

If a patient complains of headache after a fall or a hard blow to a pin, a dural puncture should be suspected. As soon as possible the patient should have a radiographic exam. Such an exam may show previously undetected skull fractures or a dural puncture. In either case, the pin should be removed after an adjacent pin has been placed. The patient should be hospitalized and given parenteral antibiotics for 4 to 5 days.

### PRESSURE SORES UNDER THE VEST



Fig. 2: Proper Hygiene Under Vest

Another problem that patients may face is the occurrence of pressure sores. This problem is a particular concern with insensate patients. The patient, the patient's family or caregivers should be instructed, by the orthotist, on how to help avoid the occurrence of pressure sores through regular examinations of the patient.

Proper hygiene under the vest is also important in preventing pressure sores and to reduce their severity. Daily swabbing under the vest with a moist terry cloth towel followed by a terry cloth towel moistened with rubbing alcohol can prevent the occurrence of pressure sores. (See Fig. 2)

The use of powders or creams of any sort should be avoided. Powders or creams may accumulate in the vest lining, may cause the lining to mat, and may aggravate hygiene problems.

One of the most common places for pressure sores occurs over the scapulae since the uprights are usually attached to the vest at this point. If the patient's caregiver finds it impossible to pass an alcohol dampened towel between the vest and scapula while he or she has the patient lie in a prone position, the orthotist should be called to relieve pressure in the area and to inspect for skin damage.

### CONTACT DERMATITIS

Sometimes contact dermatitis due to the natural lambs wool liner may occur. This problem can usually be attributed to lanolin contained in natural lambs wool. The orthotist can avoid this problem by using synthetic lambs wool as the vest liner. If the patient has a natural lambs wool liner or has developed a rash under his vest, a piece of cotton stockinette can be placed between the liner vest and the patients' skin.

### MUSCLE TIGHTNESS

Sternocleidomastoid tightness and/or trapezius muscle tightness, following halo application, can cause patient discomfort. This may be because the patient, in a supine position, fails to feel the kinesthetic reminder of support under his neck. Therefore, the

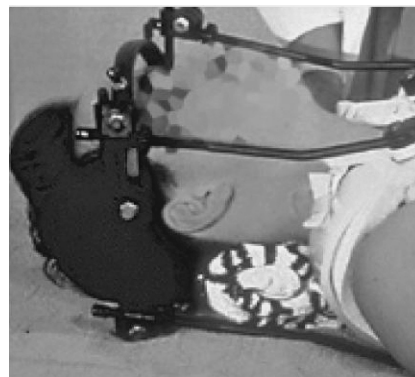


Fig. 3: Tension Relief

patient tenses up, causing pain and muscle cramping This situation is as if the patient is continually doing iso-

(Continued on page 4)

(Continued from page 3)

metric exercises in the halo. This situation can be relieved by placing a rolled terry cloth towel under the neck when supine. (See Fig. 3) Take care not to alter the cervical spine position in the sagittal plane.

### CROWN DISLODGE MENT

Special care by the orthotist during the application stage can help prevent halo crown dislodgment. An emergency visit to the patient may be avoided, by the orthotist making sure that the crown is no more than 2 cm from the skull at each of the pin sites, and by making sure that pins are placed below the equator of the skull. In large tall, patients and patients very muscular around the shoulders, I recommend adding an extra pin on each side behind the ears and in cases of very large, tall people, by adding an extra lateral bar over each shoulder for anterior/posterior control. It is imperative to apply pins not more than 1 cm above the supraorbital rim to avoid dislodgement in patients with strongly sloping forehead. Careful application, by an experienced orthotist, can often prevent the problems from occurring.

### NERVE INJURY

Nerve injury can be avoided through the proper placement of the pins, especially those pins that are located above orbits of eyes. Careful place-

ment over the lateral two thirds supraorbital rim and not too medial should prevent this.

### OTHER POTENTIAL PROBLEM AREAS

The knowledgeable orthotist will also be aware of unique patient needs arising from the patient's physique. Many patients are in a "guarded position" with shoulders elevated at application resulting in a gap between shoulder and over the shoulder straps. This will prevent cranial distraction which is important. Have patient relax and lower his shoulders. Patients who are obese may require a custom vest or custom TLSO. Patients who are very kyphotic will require a special posterior shell and longer posterior uprights to allow for the greater than normal kyphosis of their spine. In some cases, the posterior uprights can be curved to follow the kyphotic curve. In other systems, blocks are added to push the bars away from the vest to allow them to clear the kyphotic curve.

These are the major problems that can arise from the use of the halo orthosis. Once more, with training and experience the orthotist can eliminate or minimize many of the problems and their effects. Patient comfort is essential if patient compliance in the use of this important orthosis is to be guaranteed.

### CROWN MOVEMENT DURING APPLICATION

After the orthotist/MD team positions the crown/ring using positioning pins, the permanent pins are applied. The pin sites should be chosen to provide the greatest opposition to the opposing pin. The best condition would be to apply the pin 180° from the opposing pin. With the newer open-back ring/crown this ideal is not usually possible to achieve because they do not provide pin sites more than 48mm posterior to the ear. (See Fig 4, A & B) The safety provided by using an open-back crown/ring outweighs the pin site restrictions, and careful placement using an open-back ring/crown

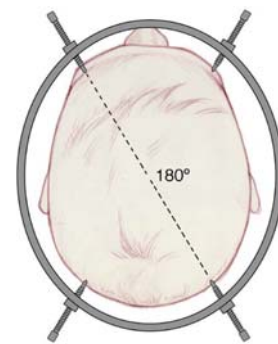
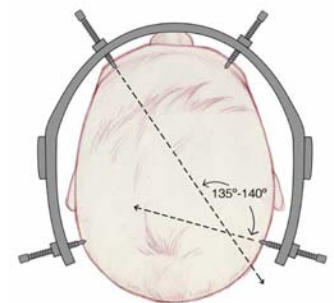


Fig 4: A. Complete Ring



B. Open Back Ring

(Continued on page 5)

will provide secure, trouble free fixation. The best pin site placement for the anterior pins can usually be achieved by using the lateral-most of the two holes which are available at the lateral half of the supraorbital rim. The most posterior hole of the posterior pins should be used unless this would place the crown more than 2 cm from the skull.

When tightening the pins the usual recommendation is as follows:

- First, hand-tighten all the pins to the point where the tip of the pin is just touching the skin. Observe the crown position from an inferior medial or superior medial vantage point to ensure the ring/crown is equidistant from the skull at all points.
- Second, tighten pins finger tight, penetrating the skin using two people each tightening opposing pins as described earlier (Newsletter: HALO Application). Again, observe crown position, making sure it is equidistant from the skull at all pin sites. Observe crown to make sure it is not being



Fig. 5

pulled more in one direction than another, which would indicate the pins on the side with greater distance from the skull are being turned too fast. (See Fig. 5) The side pulled farthest away from the skull should be adjusted by backing out the pins a few turns while the opposing pins should be tightened until the ring/crown is again equidistant from the skull.

- At this point, tighten opposing pins with partner as previously described, counting the half-turns until desired torque is reached.



Fig. 6

With the open-back ring/crown a problem can develop if the posterior pins are more lateral than posteriolateral and the anterior pins more medial than mediolateral. In this case follow the second step above by tightening both posterior pins to full tightness before doing so with anterior pins. The fixation of the posterior pins in the skull will prevent the pulling of the crown/ring anterior with the tightening of the anterior pins in the skull. (See Fig. 6)

## What's New at Ballert

On Martin Luther King, Jr. Day this year, State Representative Ricky Henden made a campaign stop at Ballert's Peterson office, where he received a tour of the facility from President Gene Bernardoni.

Rep. Henden was a candidate for Illinois Lieutenant Governor at the time of his visit.



## Facility Updates

**NEW HOURS**  
**Rush University Office**  
**1725 W Harrison St.**  
**Suite 960**  
**Mon - Fri.**  
**8:30am - 5:00 pm**

## **Staff Profile: Alicja Boniecka, CO**

**Alicja is an Illinois-State licensed and board certified orthotist. She received a BS from the University of Illinois and received orthotics training from Northwestern University's Orthotics Certificate Program. She joined the Ballert staff in June of 2007. As a practitioner, Alicja specializes in pediatric orthotics, spinal orthotics and participates in educational inservices for healthcare professionals.**



**Alicja Boniecka, CO**