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John is a 2006 graduate of Northwestern University's Orthotics Certificate Program. He joined the Ballert staff in June of 2006. John's expertise is pediatric orthotics, custom cranial molding and distraction helmets as well as trauma orthoses. As a practitioner, he participates in educational inservices for physical therapists, nursing staffs, and physicians.



**CAVEAT EMPTOR:
Not All Helmets Are Alike**
By Gene Bernardoni, CO



Introduction

Molding helmets are designed to correct skull malformations in infants before their cranial sutures have fused. In this newsletter, I describe the design features of the Ballert molding helmet that make it unique in the field. Refined over many years, these features play an important role in determining patient outcomes, reducing or eliminating the need to use multiple helmets, and avoiding design-related problems that can occur with other helmets.

The Top Opening

The opening at the top of the helmet permits heat dissipation. In some models, the hole is so large that a condition known as turriccephaly (an exaggerated heightening of the skull) can develop. (See Figs. 1 and 2A on the following page.)

The smaller top hole of the Ballert helmet helps to reduce the risk that the skull can heighten through it (Fig. 3A). Heightening that predates the helmet can be controlled by shifting the top hole off center to cover the heightened area, thereby preventing further deformation. Heat dissipation is permitted not only through the smaller top hole, but also through the vent holes, which are discussed below.

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Vent Holes

The placement of vent holes *only* over the void areas helps to prevent the development of window edema (dimpling of the scalp) on the areas where pressure develops. (See Fig. 3.)



The vent holes also allow the orthotist to verify that the helmet does not contact skull in these void areas.

Trim lines

Some designs are trimmed to permit large open spaces above and around the ears. We have found that in certain cases, these ear openings can permit unwanted medial-lateral

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Fig. 1. A large top opening in the helmet can permit the development of turriccephaly, an exaggerated heightening of the skull.

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growth from the late closing sutures (e.g., squamosal, occipitotemporal).

In contrast, the Ballert helmet is designed to fit close around the ears, a feature that prevents the development of the bulging described above. (Compare Figs. 2B. and 3D.)

The Closing Mechanism

Many helmets and bands are constructed by thermoforming the plastic with the helmet mold on its side, leaving an irregular seam which when trimmed away creates a variable sized opening (Fig. 2C).

Some helmet makers use accordion

pleats, rubber bands, springs or the like to close or fill the opening, but there is not a uniform seam, and it is not possible to control its width. These mechanisms leave mothers with the dilemma of not knowing exactly how much to tighten the helmets. In addition, the large gap at the side of the head may also contribute to bulging from late-closing sutures. (See Figs. 2B and 2C)

The Ballert helmet is constructed from a single piece of plastic draped over a cast of the skull. After the plaster cools, the single seam along the side is cut in an interlocking way, eliminating completely the gap of closure seen on many other helmet designs. The interlocking design acts as a solid, unseamed helmet by preventing sheer and thereby fostering a more symmetrical correction. (See Fig. 3B.)

Lining

The Ballert helmet has multiple removable layers of foam lining, all of which are unseamed. This allows the practitioner to modify the helmet as the infant's cranium grows, thereby reducing or eliminating the

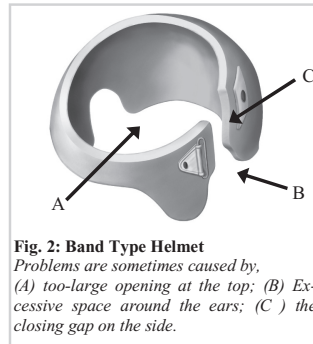


Fig. 2: Band Type Helmet
Problems are sometimes caused by, (A) too-large opening at the top; (B) Excessive space around the ears; (C) the closing gap on the side.

need for multiple helmets. (Fig. 3F)

Conclusion

Because the window of opportunity for correcting positional plagiocephaly is small, Ballert feels that the Ballert helmet is a wise choice for three primary reasons: First, our helmet provides more complete coverage of the skull, directing growth only to the flat spots of the skull, and facilitating quicker correction of the condition. Second, the Ballert helmet helps to prevent unwanted growth superior to the ears and at the top of the head. Third, a bonus, may be a quicker correction due to limiting skull growth to *only* the void areas.

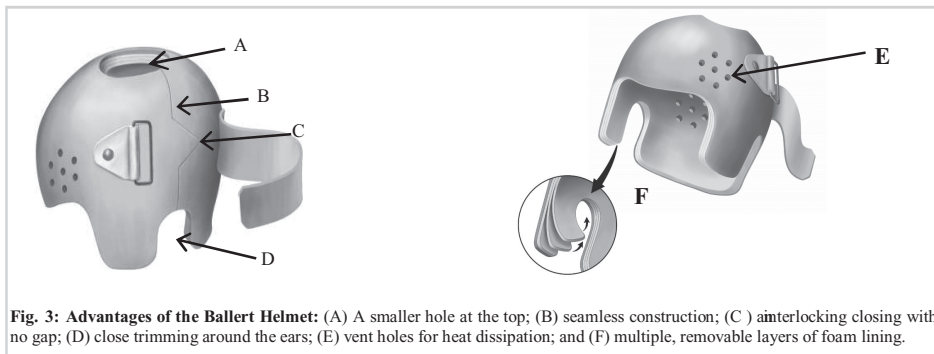


Fig. 3: Advantages of the Ballert Helmet: (A) A smaller hole at the top; (B) seamless construction; (C) interlocking closing with no gap; (D) close trimming around the ears; (E) vent holes for heat dissipation; and (F) multiple, removable layers of foam lining.

Cranial Distraction Helmets

Gene Bernardoni, R.PH, CO, C.PED

Cranial distraction has enabled surgeons to obtain better outcomes from certain surgeries and to perform other procedures that had not been possible before. Craniofacial surgeons have come increasingly to include cranial distraction in their arsenal of supportive procedures.

As a certified orthotist, my involvement with cranial distraction began about 12 years ago, when I started working with Dr. David Frim of the University of Chicago Hospitals. Dr. Frim was treating children affected with positional plagiocephaly (flattened or misshapen head). Positional plagiocephaly was easily correctible with the use of a helmet, most optimally when the infant was between four and six months of age, when the skull was still growing fast, and the sutures are still open.

If helmet therapy was not initiated before suture closure, the only course of treatment was surgical. In these cases it is done to enlarge the skull to make room for a rapidly expanding brain. In other instances, premature suture closure resulted in malformations requiring surgical intervention. When surgery was performed, an external force was required to hold or enhance the corrections. I began working with Dr. Frim and his colleague Dr. McKay McKinnon to devise a sound method for achieving cranial distraction.

It was evident that distraction of the cranial bones required a foundation from which to effect distraction.

I reasoned that the helmets I was fabricating for positional plagiocephaly could serve as that foundation. A suture could be left exiting the skull at the point or points where distraction would be needed.

I studied the surgical plan to determine the areas of the skull where the counterforce of the distraction foundation would not compromise correction.



Fig. 1: Distraction Helmet

Using a Ballert Custom Helmet, I cut out an opening over the area to be distracted (See Fig.1.), while allowing counterforce in nonsurgical areas to stabilize the helmet in place as distraction is applied. I constructed a bar much like those used as face guards in football helmets. I drilled holes in the bar at the site of the protruding suture and threaded them to accept a Halo pin. I attached a length of orthodontic spring, a swivel and a pinch clip or jewelry clasp. Distraction is achieved by turning the threaded Halo pin counterclockwise. The orthodontic spring maintains a constant fixed tension while the clip or jewelry clasp allows easy connection and disconnection if the helmet

needs to be removed for hygiene.

We have had success with this distraction system and due to its non-invasive nature have not had secondary complications such as pin site infections.

Prior to our use of a helmet as a non-invasive device for distraction, a Halo ring and skull pins were used. A special devise called the Red Devise was invented by Dr. John Polley of Rush University Medical Center. This devise has been very useful for distraction and especially facial distraction. It has gained wide acceptance especially with older children.

Various other distraction devises have been used which allow multiple distraction sites and angles of distraction. I have fabricated a distraction globe for this purpose. (See Fig. 2.) It can be attached to either a Halo ring or a Ballert Custom Helmet.

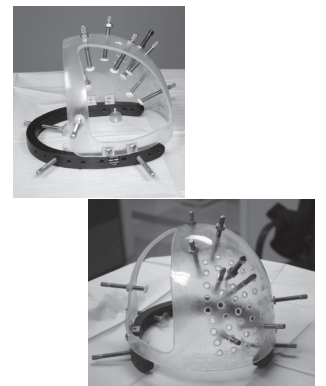


Fig. 2: Distraction Globe