Ice Hockey helmet chin straps, design issues and recommendations for youth play.

US Youth Sports Apr 2011 (Revision 2)

The following was taken from
http://www.mayo.edu/cme/files/dmfile/Rationale_Collaborative_Action_8_24_10.pdf
US Youth Sports comments in blue text.
However there is a typo, the research was conducted in the mid to late 1990's prior to being published in 2000, not demonstrated in 2004 as stated below. The HECC has known about this chin strap issue for over 11 years and has done nothing. They do not want to change the appearance of the game “we don't want hockey players looking like football players”.

Head injuries, including concussions often occur because helmets fall off during play because they are not properly secured. See Figure 2. In the final round of the 2010 Stanley Cup play-offs, at least eight Chicago player helmets popped off during contact.

Figure 2

Players without helmets are clearly at risk for neurotrauma. When a Division I college player lost his helmet during a game in 2008 following a glancing blow to the head, he required emergency neurosurgery to treat an open, skull fracture.

To address this issue, LaPrade, in 2004 (37) demonstrated that a four point chin-strap system could stop the posterior tipping that occurs with the current two point system, particularly when the two point system it is accompanied by a loose strap. (The research published in 2000 also showed that it may have prevented 37 facial lacerations recorded during the research that required sutures to close, even though the 2 point chin straps were worn properly)

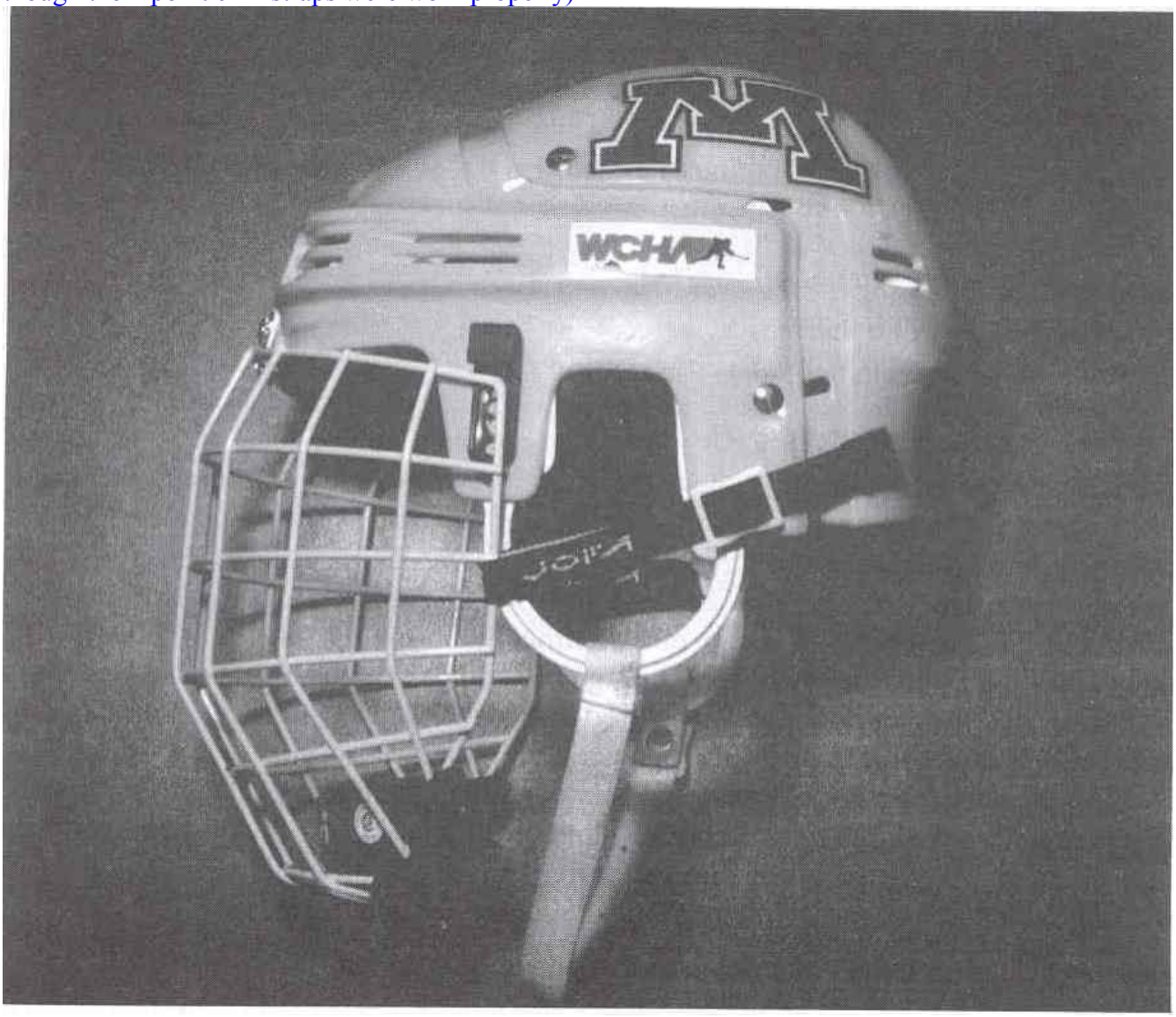

Figure 3 (Single chin strap mandated by the HECC's selection of the ASTM helmet standard)

Figure 4 (is actually a copy of the picture from the cover of Safety in Ice Hockey 3rd Vol published in 2000)

Head trauma, including concussions that occur due to helmet loss may be prevented using a four point strap system along with a properly fitted and worn chin strap.

Two ice hockey helmets were used for testing. Both ice hockey helmets had plastic chin strap buckles as shown in figures 5 and 6

Both failed the preliminary load testing at < 50 ft lbs. (DOT FMVSS 218 a 50–pound (22.7 kg) preliminary test load is applied to the retention assembly, normal to the basic plane of the test head form and symmetrical with respect to the center of the retention assembly for 30 seconds)

Helmet A: The strap completely slid out of the buckle during the preliminary load testing leaving the buckle attached to the snap base screwed to the helmet.

Helmet B: The snap buckle failed at < 50 ft lbs while attempting to load the chin strap, separating the snap buckle from the snap base.

Conclusion: Plastic snaps should not be used on helmets.

Figure 7 is a clear color picture of 2 point chin strap attachment.

Figure 8 is the posterior tipping of the helmet allowed by floating chin cup and 2 point chin strap.

Figure 9 is a clear color picture of 4 point chin strap attachment

Figure 10 is the 4 point strap that does not change the appearance of the helmet and does not allow for posterior tipping of the helmet.

Figure 5 Helmet A

Figure 6 Helmet B

Figure 7 2 point chin strap attachment on helmet B

Figure 8 Posterior tipping with a properly adjusted chin strap helmet B

Figure 9 Helmet A with 4 point MICH chin strap installed

Figure 10 Helmet A with 4 point chin strap installed and cage straps fastened. It does not change the appearance of the helmet. This chin strap system using a slide buckle load tests to 215 ft lbs on military helmets* before buckle failure and will improve helmet retention. However it may not prevent all helmet loss.
(*Failure threshold could not be reached during testing on ice hockey helmet A due to helmet shell flex. The chin cup bottomed out on the face mask before the chin strap slide buckle failed.)