

In Sept. 2001, Zhang et al found that EMG values of the force generated around the deltoid (shoulder) complex improved significantly when maximal bite was produced on a MORA device. Subjects were asked to raise a 5kg weight overhead in a fixed plane (meaning they used a machine instead of a dumbbell) and the force generated was measured.

In June 2003, Kokubyo et al discovered that again, maximal teeth clenching just before and during a voluntary isometric (weightlifting) contraction improved maximal strength and rate of force development in the muscle. However, maximal strength wasn't actually measured with and without the device, so it's unclear how this determination was reached.

Other studies as early as the late 1970s reported improved strength using a MORA device; however, a study in the Journal of the American Dental Association in 1996 discounted the vast majority of these studies because of their flawed design (no double-blind, poor control groups, and poor study design.)

While these two studies indicate that a player may indeed be able to recruit more force while biting hard on an appropriate mouthpiece, does this necessarily translate into a stronger hockey player? Consider this:

1. Maximal force (bite) was used in every test cited above. In an athletic situation, can a player be expected to bite as hard as possible during an entire game? Of course not. The question then becomes: can a player develop maximal biting force in time to anticipate an event in which they need maximal strength (eg to hit, to take a hit, to shoot?) Perhaps, in the situation where they player can anticipate the hit or shot. In an unforeseen event, though, like being hit from the side or from behind or from an unseen player, it's unlikely. As an adolescent, most players don't have the awareness to anticipate most of the hits they'll receive.
2. Research has largely focused on individuals who have never lifted weights before. We can then assume that the subjects of the studies were unfamiliar with abdominal bracing techniques employed by athletes and didn't know how to close the glottis without the use of the mouthguard, which comes naturally to any athlete who's braced for a hit or a shot before.
3. Even if strength in the weight room increased by 20% using the mouthguard, how much of this strength will transfer to the ice? In a compound movement like a squat or deadlift, which emphasizes lower-body strength, it's estimated that only 60% of strength will transfer to power in an instant (Siff, 2002.) In any research where full-body movement was tested with a MORA, there was no significant strength increase (JADA, 2002.) Only in instances of upper-body isolationist movement were strength increases shown. When do these types of movements occur in sport? Never. Well, maybe in wheelchair badminton, but that's the only legitimate sport needing a stationary overhead movement.

4. No research has ever studied the effect of a mouthguard on strength in a dynamic situation (ie sport.) Will the player have time to bite down? Will they have time to bite with maximal force? Will they be distracted from the play as they try to remember to bite down hard? Will abdominal bracing, which protects the spine from impact, be compromised? It's easy to see how a device which distracts a young player can actually make him or her LESS efficient and even lead to injury.
5. Lastly, though I hate to present anecdotal evidence, I feel this is an appropriate point since ALL the evidence presented by the sellers of MORAs appear not to be rooted in science: which professional powerlifters or olympic-style weightlifters use the appliance? None. If any sport would benefit from the purported strength gains in a controlled environment from a MORA, it should be powerlifting. One movement, no surprises, controlled path of motion. Powerlifters are notorious for trying to find anything that will make them stronger; since 'strength-enhancing' mouthguards have been around since the 1970s, wouldn't even 1 in 100 use them in a competition? Yet none do.

There isn't time or space to bring up the next argument: are the promoters of MORA devices like the XLR8 mouthguard ignorant of research, blind to human kinesiology, or trying to make a quick buck? You decide. For now, though, get a well-fitting mouthguard to protect your teeth, and gain your strength in the weight room.