Bilateral vs. Unilateral Training: Which is better for the elite ice hockey goaltender?

By Taylor Selman

Today’s elite ice hockey goalies are finding themselves in high-paced game against some of the best players the world has ever seen. With forwards perfecting precision passing and shooting, goalies are required to make increasingly difficult saves requiring explosive power as they move about the crease.

Goalies using the butterfly position (inset) as a main part of their play style must train to get back on their skates in a stable position ready to make the next save. The butterfly is a great position to stop low shots and seal off the 5 hole however, there are also weaknesses: dropping into the butterfly leaves the goalie temporarily immobile and often out of position if the puck rebounds to either side. In order to combat this the goalie must recover to their feet ready for the next shot or risk a big open net. For the best possible recovery a goalie must explode out of the butterfly and set up in the fastest possible movement. The recovery out of the butterfly requires power, core stability and great balance, often utilizing one large unilateral push with the trailing leg to propel the goalie up out of the butterfly and into position.

Training for ice hockey presents its own unique challenges, predominantly the need for ice to complete sport specific training. Off-ice training can be used to produce gains in power and speed that would be otherwise unattainable with on-ice training only. The off-ice training plan must be created with position specific drills and movements. Picking the correct exercises is important to maximise off-ice training time so when your goalie steps on the ice they can focus on developing skills. With this in mind, how best do we train an athlete for explosive power and stability?

Two kinds of exercise a trainer can utilize are bilateral and unilateral. An athlete trains bilateral when they use both limbs to complete a task, this has been used as an effective training technique for generations. Bilateral training can be done in
both closed kinetic chain exercises as well as in open kinetic chain exercises (Harrast and Finnoff, 2012). Many lifts designed to increase lower limb power are bilateral lifts, including many forms of squat (Hermassi et al, 2011; Chaouachi et al, 2009). In contrast, exercises that only use a single limb are classified as unilateral. Exercises like lunges and pitcher squats where the majority of the load is on a single limb are considered unilateral even though both limbs are in contact with the ground (Harrast and Finnoff, 2012; Jones et al., 2012). Like with bilateral exercises these can be preformed both in an open kinetic chain and in a closed kinetic chain (Harrast and Finnoff, 2012). With a multitude of exercises able to be completed bilaterally or unilaterally picking the right exercises for your goalie is key to developing an effective training program.

When creating a training program some key factors must be included: firstly, the goalie’s strength deficits and current levels of strength and conditioning. Bilateral and unilateral exercises can be used in the early stages of training to great effect (Mccurdy, 2005). However, the increases in early stage of training were only shown to be present in untrained individuals. This creates the need for trainers to pick exercises that meet the goalie’s specific needs, whether that need is improvement in core stability or increasing power. Miller (2012) reported bilateral lifts produce more power enhancements when compared to unilateral lifts. However, there is evidence that during lower limb bilateral training, bilateral deficits are present due to muscle coordination (Rejc et al, 2010). Unilateral training has been reported by Hale et al (2014) to have an effect on the contralateral muscle to that being trained. They demonstrated that during use of unilateral balance exercises, ankle instability in the affected side was reduced when the stable ankle was trained. In contrast, Carroll et al (2006) investigated the literature around the subject and concluded that though an insignificant increase in neurological function of contralateral muscles was present this in no way indicated a increase in muscle function.

Other aspects of a goalie’s training program should also be considered; core stability and the body’s physiological response is crucial for stability. Standing unilateral exercises promote more core activation than seated or standing bilateral exercises and can be used to during training to improve core stability (Saeterbakken and Finland, 2012; Kibler et al, 2006). Trainers must also take the body’s response to training into consideration. Lactate production and rate of perceived exertion can hinder training efforts, but the effects of both bilateral and unilateral training remain
similar (Costa et al 2015). Testosterone levels were shown to be consistent during both styles of training as well (Jones et al, 2012). This similarity between training styles provides the trainer the ability to pick the exercise best for what the individual player needs.

With both bilateral and unilateral exercises providing benefits that surpass the other why not use a combination of both? Ramierz-Campillo concluded from the 2015 study on young soccer players that a combination of both bilateral and unilateral exercises produced the best improvement in both muscular power and endurance. Furthermore, Beurskens et al (2015) described increases in balance and reduction of bilateral strength deficits with a training program with bilateral heavy resistance exercises and a unilateral balance program. These studies include aspects of bilateral and unilateral training and report benefits that fill many of the requirements needed by goalies at elite levels. With the body reacting very similarly to both styles of training and both give unique benefits, it is in the best interest of the trainer to include both bilateral and unilateral training. Including both will maximize off-ice training and provide the explosive power and core stability today’s goalies need in elite level ice hockey.
Reference List


