Muscular Analysis of the Power Clean Lift

Kinesiology (HPE 350)
Augsburg College
By: Maria Bartoletti
November 27, 2010

Introduction

The purpose of this paper is to examine the power clean lift by breaking it down into phases that demonstrate and explain proper form; meanwhile, explaining the benefits to correct form. The results and conclusion from this paper will be applied for personal use and for coaching purposes.

Activity: Power Clean.

The power clean is an Olympic style lift that focuses mainly on building explosive power and strong legs. It requires flexibility, time and patience to learn it, and correct technique for it to be of any benefit.

Phase 1: The Deadlift

The power clean is started with the bar on the floor and it is "deadlifted" to mid-thigh or just above the knee. Once the bar is past the knees, it should never break contact with the thighs until it passes the hips. This is the first of two "pulls" involved in the lift (Mehdi, 2007). This pull should be slower than the next one and more stable. The deadlift phase includes ankle, knee, hip, and shoulder extension. The knees extend until the legs are straight. Ankles go through slight extension (until the Tibia is vertical). The hips are extended by the femur moving to a vertical position (straight up and down). The shoulders are extended by the arms dropping back towards the body while still holding the bar. The fingers are flexed around the bar and the thumb is in opposition.

Phase 2: The High Pull

From the top of the knees, the bar is "popped" or pulled almost straight up the body to the top of the chest, much like in the high pull or upright row exercises. This is the second pull of the lift. It should be much more explosive than the first. The reason for that is so it is easier to

continue moving the weight up with little assistance from the legs. The high pull phase includes lateral abduction of the shoulders, flexion of the elbows, abduction of the wrists, extension of the spinal column, elevation of the shoulder girdle, and explosive anterior rotation of the pelvic girdle. Lateral abduction of the shoulders depends on the style of the lifter. Some lifters abduct the shoulders until the humerus is almost parallel with the floor, and some only go about half that distance. The elbows flex until the forearms at are about a 90 degree angle with the humerus. The wrists abduct as the bar is pulled straight up the body to keep the grip while the arms are in motion. The spinal column extends until the spine is in line with the rest of the body (should be straight up and down). The shoulder girdle elevates to help "shrug" the bar further up the body, almost until the tops of the shoulders are touching the ears.

**Note: there is an optional "foot stomp" motion that some lifters perform during this phase and the rack phase. It is not necessary for correct power clean form, but it has been said to be useful. It helps the body drop down faster to catch the bar and can act as a chance to readjust the feet into a wider stance to form a more stable base for catching the bar (Mehdi, 2007). Some lifters use a very exaggerated stomp and some only slightly move the feet, it all depends on preference.

Phase 3: The Rack

Once the bar is pulled to the top of the chest and the elbows are pointing laterally away from the midline of the body, they must be pushed anteriorly under the bar directly in front of the body and the hands must rotate under the bar to "rack" it on the top of the chest and finger tips. At the end of this phase the bar should be pushed back against the base of the throat and almost resting on top of the shoulders. The elbows should be pointing in and be as high in the air as they can go (reduces stress on the arms). The bar should be on the tips of the fingers with the palms facing the ceiling. The rack phase includes elbow and shoulder flexion, and wrist

hyperextension. The shoulders horizontally adduct until they are extended in front of the body with the humerus parallel to the floor. The elbows flex until the forearms are touching the biceps. The wrists hyperextend and the backs of the fingers should rest on the shoulders/upper chest.

Phase 4: The Front Squat

[This happens at the same time as phase three.] While the elbows are shooting forward, the rest of the body should be dropping back down to help catch the weight of the bar (this is where the "foot stomp" would take place). The hips may or may not go below parallel with the thigh. The purpose of this is to reduce the struggle of having to hold the weight of the bar while changing the grip on it. Once the arms are in place and the bar is racked, all that is left to do is stand up. The front squat phase includes hip, knee, ankle, and spinal column flexion and extension. The hips flex so the upper legs are point straight out in front of the body, and then extend until the legs are straight. The knees flex almost to the point of the starting position, and then extend until the legs are straight. The ankles flex as the body drops and then extend along with the hips and knees. The spinal column flexes as the body drops down to catch the bar and then extends (lumbar) until the body is straight up and down.

Olympic lifts are usually full body lifts, meaning they require upper and lower body muscles to work at the same time (or in different phases). The main muscles used in the power clean lift are the hamstrings, quadriceps, gluteus maximus, erector spinae, and trapezius. Non-primary muscles involved with the power clean are the muscles of the calves, forearms, and shoulders (see appendix A for a chart).

Form is incredibly important when doing power cleans, mainly because of the risk of injury from doing them improperly. It is important to keep the legs shoulder width apart when performing the whole lift to prevent back injuries and keep a stable base. Though, too wide of a stance and the arms will not be able to hang down outside of the legs where they need to be. A fairly wide grip should also be used to hold the bar (slightly wider than shoulder widge, about 15-21 inches). If the grip is too narrow then it will be incredibly hard to move the weight as high as it needs to go and the upper body will become overworked. It is crucial to keep the back straight throughout the entire lift. If the back becomes rounded than an incredible amount of strain will be put on the lower back which can cause serious injury. If the power clean is not done with proper form then the correct muscles will not be engaged.

Chapter III

I. The most important muscles for this lift are the hamstrings, quadriceps, erector spinae, and trapezius. It is important to have powerful legs because the main parts of this lift are dedicated to the lower body. Strong legs are needed to explosively pull the bar off the ground, catch it, and push it back up again at the end of the lift. It is important to have strong trapezius muscles so that the bar can be pulled high enough to jump under it. Also, the higher the bar is pulled, the easier finishing off the lift will be because less of a squat will be required to get down under the bar in the rack and front squat phases.

II. Exercises to strengthen the muscles of the power clean lift (in order):

(Start with lifts that are the most complex and require the most joints first.)

a. Back or Front Squat—develop the muscles of the legs and teach muscle memory for a squat position. Good for the final phase of the lift.

b. Deadlift—helps develop the leg muscles and builds good muscle memory for the first phase of the lift. Also teaches the lifter to keep the weight (of the body and bar) balanced in the heels.

c. Lunges (walking or not)—help develop great hip and knee flexibility which are very important for the power clean. Also help build strong quadriceps and hamstrings.

d. Leg Extensions—good for focusing mainly on the quadriceps (an important muscle in the power clean lift).

e. Leg Curls—good for focusing mainly on the hamstrings (an important muscle in the power clean lift).

f. Power Shrugs (barbell or dumbbell shrugs)—good for developing the trapezius muscles which are important in phase two.

g. High Pulls/Upright Rows—basically doing the second phase of the lift. Good for developing the trapezius and other upper body muscles as well as learning muscle memory for the second phase.

h. Agility Cone Drills are good for working on explosiveness and quickness of the legs which is important in the power clean. Though the power clean does not involve agility, cone drills work the same muscle fiber types that a power clean does.

These lifts were chosen because they are basically the phases of the power clean broken down into their individual lifts. It's easier to train the muscles one at a time and to prepare for power cleans by training your body to do each phase correctly.

Conclusion

The intended results after power clean training would be stronger legs and more explosive power in the lower and upper body. The easiest way to test this would be to do a one or three repetition max of the power clean before training occurs and then do it again after training is completed. It might also be a good idea to film both so the technique can be broken down and problem spots can be found. A more complex way to test results of training would be to do one repetition maxes of each of the individual lifts involved in the power clean (deadlift, high pull, and front squat) prior to and following the training. If all of the weight number are increased after training, it could be due to proper technique being learned (making it easier to do the lift = easier to lift more weight) or stronger muscles being developed through training.

References

2 Athletes. (2009). *Power clean*. Retrieved from http://www.2athletes.com/Exercises/Traps/power-clean.html

Maggary, V. (2009). *How to power clean.* Retrieved from http://www.gymjunkies.com/how-to-power-clean/

Mehdi. (2007, November 6). *The ultimate beginner's guide to power cleans.* Retrieved from http://stronglifts.com/the-ultimate-beginners-guide-to-power-cleans/