

Coaching Tips 3 BOW HAND

Before we look at the bow hand and the correct position on the bow we need to firstly look at the bow arm as the position of the bow hand has a significant effect on the bow arm orientation.

The arm is made up of three bones, the forearm has the ulna and the radius and the upper arm the humerus. The ulna and radius attach to the humerus at the elbow joint.



The humerus attaches to the shoulder blade (scapula) as a ball and socket, this allows for arm movement and in particular rotation of the shoulder/arm.

The arm is controlled principally by two large muscle groups along with a number of smaller muscles 1) the biceps muscle which sits on the top upper arm and goes between two points at the elbow attaching to the ulna and radius and two points on the collar bone and 2) the triceps which sits on the bottom of the upper arm and attaches to two points to the ulna and radius and two points on the scapula.

These muscles along with a number of smaller muscles control the movement of the arm, the biceps pulls the forearm toward the upper arm and the triceps counteracts the biceps by extending and straightening the forearm.

The orientation of the humerus (upper arm bone), around the shoulder is controlled by a number of very large muscles around the shoulder joint and influence the orientation of the arm, there are also some quite small deep muscles around the joint called the rotor cuff which influence the rotation of the arm.

It is common to hear of injuries to the shoulder and these are referred to as rotor cuff injuries, what is being damaged are the tendons associated with the rotor cuff.

Of course we want an archer to have a technique that provides them with maximum results but with no injuries. The guiding principle of biomechanics is not to use muscles that are not necessary, so if there is a way we can shoot without the need to use muscles then we should use this method. Muscles should be as relaxed as possible during shooting and only use muscles that must be used.

It is common to see archers rotate the shoulder toward the arrow, if this is done it immediately requires the use of the rotor cuff muscles, placing them under stress, the muscles will fatigue quickly and long term will cause injury.

The bow shoulder should at all times be positioned in a neutral position.

If we were to stand upright with our arms by our sides and simply raise our bow arm to shoulder level with the palm of the hand pointing at the ground without rotating the arm and elbow, this is the shoulder orientation and in particular the position of the humerus that is required to shoot a bow without the need to use rotor cuff muscles.

You will also note the position of the bones (ulna and radius) in our forearm when the palm of our hand is pointing toward the ground which is important for a correct bow hand position.

By relaxing the bow shoulder and not rotating the shoulder, the orientation of the elbow is at about 30° above square, it should never be greater than 30° or less than square, this will indicate rotation of the shoulder.

The correct orientation of the elbow should have the ulna and radius aligned with the shoulder, drawing A, this orientation of the bow arm requires almost no use of muscles to control the elbow, this position also gives you clearance for the string.

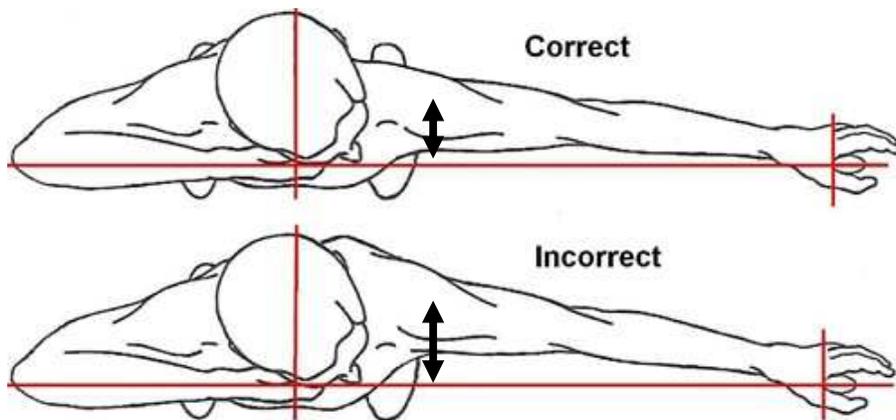
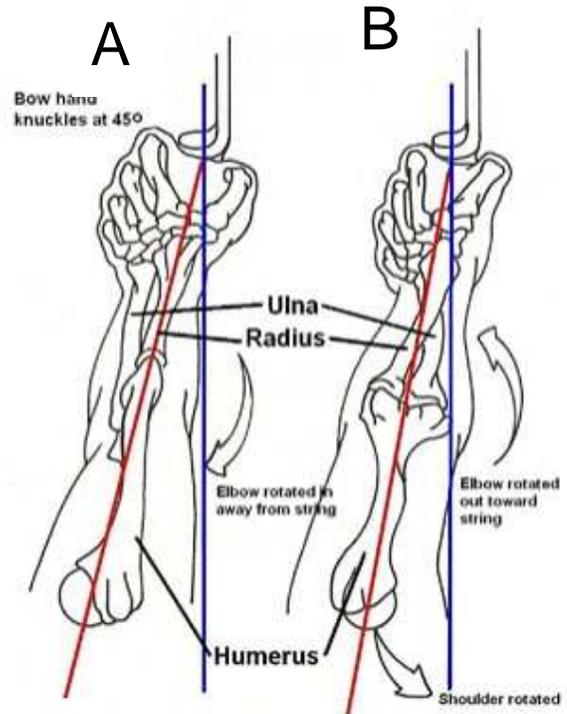
If you were to rotate the shoulder you would find the ulna is rotated toward the string and radius back away from the string drawing B below which flattens the elbow bring the arm into the line of the string.

This places excessive loading on the elbow and requires the use of muscles to control the elbow, in many cases this will place the arm into the path of the string.

The shoulder also is placed under excessive loading requiring the excessive use of muscles in particular the rotor cuff.

By having a relaxed bow shoulder in a natural position you will now find it much easier to move the shoulder joint in (not rotate) toward the arrow when at full draw.

Ideally we should have our shoulder joint positioned as close as possible towards the arrow when at full draw without creating clearance problems with our forearm.



Having the bow shoulder joint as close to the arrow as possible is very advantageous from the point of view of minimising the muscles being used.



Archer displaying correct bow hand position and elbow position

The bow arm shoulder is also correctly oriented.



Archer displaying poor bow hand, with the hand rotated almost vertical resulting in a rotated elbow.

The bow arm shoulder is rotated out of line, the head of the humerus would also be out of alignment. This can easily be identified due to the rotation of the elbow.

This requires a large amount of muscle usage to control the shoulder and elbow.

What's all this to do with your bow hand you may ask?

The orientation of the bow hand on the bow has a direct influence on the position of the elbow and rotation of the bow shoulder.

If we go back to the exercise of standing upright with our arms by our sides and raise our bow

arm to shoulder level with the palm of the hand pointing at the ground without rotating the arm we now have the correct shoulder and elbow orientation. Now to find the correct bow hand position we simply rotate our hand at the wrist 45° without rotating our elbow, although this will be a minor amount of rotation of the elbow which is unavoidable.

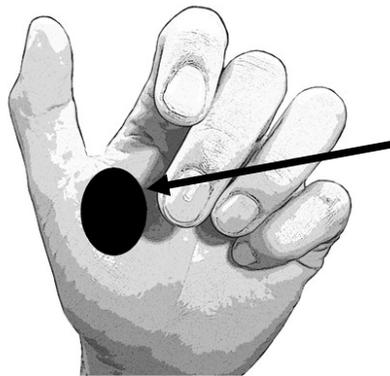
People who have a problem with elbow rotation usually take the load of the bow by rotating the elbow and not the wrist.

The hand is placed on the bow handle so pressure is high in the Thenar Eminence – otherwise known as the thumb muscle. There should be no contact with the bow grip beyond the “Life Line” onto the palm of the hand as this will induce torque (side to side rotation) on the bow or low on the thumb muscle as this will create back to front rotational inertia. Care should be taken not to contact the grip high in the webbing between the thumb and first finger.

This area is very soft and fleshy and will result in inconsistent pressure and inconsistent bow hand placement.

Ideally all fingers should be relaxed, slightly curled over in a natural position, not tucked in or curled around gripping the bow and in particular not held straight.

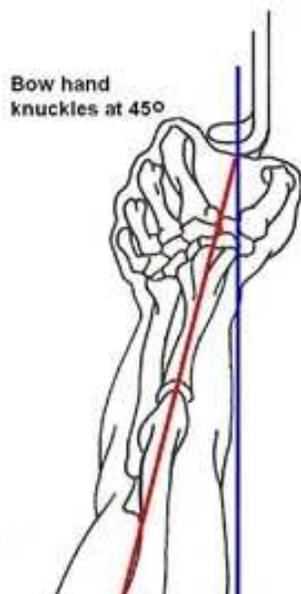
Straight fingers increase tension in the hand, and the temptation to grab the bow upon release.



The bow hand should contact the bow directly behind the “Line of Force” of the bow, high on the thumb muscle with now contact on the palm of the hand or low on the thumb muscle.

Place hand on the bow grip so the pressure point is as high as possible into the pivot point of the bow.

The “Line of Force” should be over the wrist where the radius joint meets the hand, this is the strongest joint in the wrist and means the force will be directly along the radius and through the elbow. If the ‘Line of Force’ is not over the radius wrist joint



other then the line of force not being directly through the bones in the arm and square into the shoulder, the bow hand will be under unnecessary tension which will result in side to side bow torque on the bow grip upon release.

Ideally the knuckles of the bow hand should be at 45°; this can also be used as a quick visual reference to see if a person has their bow arm correctly orientated and relaxed. If the bow arm is not orientated correctly the knuckles of the bow hand will not be at 45°.



Radius Joint

The correct bow hand position should have the first finger

positioned higher than the thumb, as demonstrated in the picture to the left.



For most recurve bows the grip is designed to allow for this hand position. If you look at the design of a recurve bow grip the grip should slope (see picture below) away to accommodate the bulk of the thumb muscles, making it easy to have a low thumb position and keeping the fingers at 45°. If the grip is flat this will force the thumb to be high and the hand can not achieve the 45° orientation.

If the bow grip is flat and does not slope or the bow hand is not placed correctly the bow hand will be forced into an unnatural position with the thumb square or higher to the index finger.

This will force the hand into a vertical position resulting in rotation of the elbow and shoulder and unnecessary and excessive use of muscles.

Modern compound bow grips usually do not have the sloping grip although compound bows from the past did as they simply used recurve grips. Modern compound grips are only around 12mm to 15mm wide so the thumb muscle sits free from the bow grip making no contact, the same principles must apply with the life line position which should be positioned on the outer edge of the grip again the index finger

positioned higher than the thumb, remember the excess thumb muscle sits free from the bow.

Photo right - Poor bow hand, the hand is rotated almost vertical, the archer is gripping the bow, as well as contact with the palm of the hand.

Also note wrist contact with the bow which is against World Archery rules.



Photo right and left- Good bow hand, no contact with palm of hand, finger relaxed and slightly curled.

Note the index finger above the thumb.



Written by and images by Jim Larven
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