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OSTEOPATHY

Grand Western Archery Society
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The Ultimate Goal

- Efficient Posture, Archery Specific.
- Easy to Achieve
- Easy and Natural to Maintain
- Well resourced

Ideal posture – general principles

- The best posture is the one that uses the minimum of energy to maintain.
- This begins with the palatine bone in a horizontal plane and at a 90 degree angle to the trachea, eyes looking forward rather than down the nose;
- It continues with the Ear over Shoulder over Hip over Knee, down the front of the shin to the front of the ankle.

Ideal

Ideal Posture – Adapted for Archery

- The archer will adapt this ideal and lean slightly forward.
- Maintain the line through the whole body from ankle to ear but place the ear vertically over the Hallux / phalanx joint (big toe).
- This reduces the "upper triangle" and minimises the impact of the string on the chest but maintains the even muscular action and most of the efficiency.

Upper Triangle and Posture with Lines

The 3 units

- Foundation unit - the basis on which you rely to make a shot.
- Solid base, large enough for stability and providing a level sacral base.
- Power unit – acting from the foundation unit and delivering the energy into the bow and string to power the arrow.
- The Aiming unit – evaluation of distance and fine tuning. This feeds back alterations in position but not action of the other 2 units.

Foundation Unit

- The stable foundation upon which function can take place.
- The Spine, Pelvis and legs form a stable base upon which the power unit and the aiming unit can work .

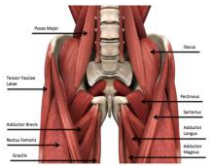
Evaluation of Foundation Unit

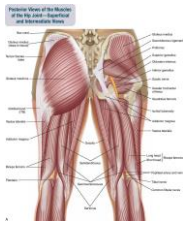
- Turn out of the foot and arch flattening – if present will lead to an anterior pelvic tilt, knocking of the knees and protruding abdomen.
- Hip external / Internal rotation – external rotation can be due to the flattening of the foot or found in a sway back posture, lax abdominals and over tight hip flexors.
- Level sacral base – assessed by observing the dimples on the lower back. If not level, seek professional evaluation, this may be a back issue or in need of help from a podiatrist.
- Spine line straight and vertical from the sacrum to the base of the skull.

Muscles involved in Foundation unit

- All foot and calf muscles, Thigh muscles, abdominals, Psoas and erector spinae from the lower back to the base of the skull.
- Lookup list for reference:
  - Quadricep, Hamstring, Tensor Fascia Lata, Gluteus (Maximus, Medius), Piriformis, Rectus Abdominis, Psoas, Iliacus, Internal and external abdominal Oblique, Erector Spinae, Soleus, Gastrocnemius, Peroneus Longus & Brevis, Tibialis Anterior and Posterior, diaphragm and intercostals.
- These last 2 – diaphragm and intercostals – will be mobile in this unit more than the others.

Groin to leg muscles



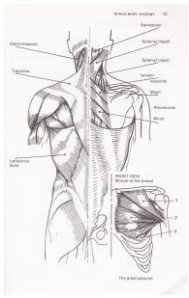


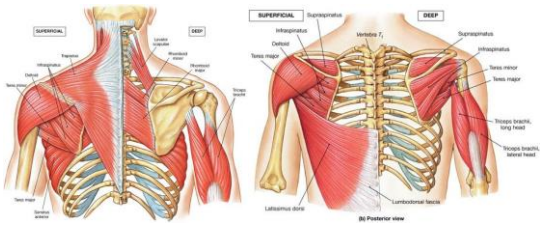
Stabilizers of the Shoulder

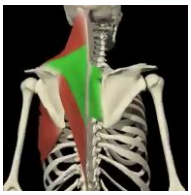
- These will act in the power unit and in the foundation unit.
- Look up list for reference:
  - Supraspinatus, Infraspinatus, Teres Major and Minor, Subscapularis, Subclavius, Biceps, Triceps, Trapezius, Serratus Anterior, Deltoid and Latissimus Dorsi.
- Many of these have a power function in the draw and a stabilising function in the aiming part of the shot. Some will function at loose.

Power Unit

- Supraspinatus, Infraspinatus, Teres Major and Minor, Subscapularis, Subclavius, Biceps, Triceps, Trapezius, Serratus Anterior, Posterior and Middle Deltoid and Latissimus Dorsi are all used at different times to pull the bow.
- Activation of the extensors of the elbow in the bow arm, Triceps; and the forearm flexors on the string arm are required to reach full draw.
- Freedom in the Pectorals, Major and Minor, Anterior Deltoid and Subclavius will make the draw easier.

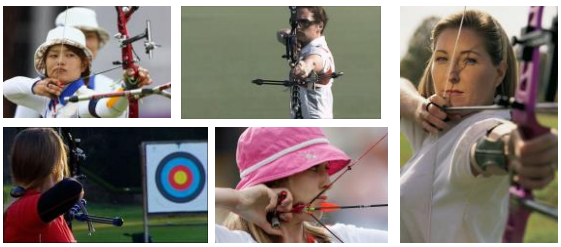






The Aiming Unit

- Any organism with binocular vision can tell exactly how far away anything is as long as the eyes are level.
- This is such an inbuilt feature of all predator species that it is automatic and unconscious in application.
- Freedom to easily allow this to occur – thus minimising the use of resources – is the suggestion here.
- Neck mobility, particularly in turning, and the muscles of the front and back of the neck being free to act without being recruited toad power to the draw is preferable.
- "Recruiting" means the use of accessory muscles to boost the power for an action when the prime movers of that action are insufficiently powered to do the job. This will cost energy and perfect alignment and attenuate the shot.



Aiming –
Eyes level to judge distance.
Head and neck muscles act both efficiently to conserve energy and prevent strain and to give a consistent anchor point.

Exercises

- Provide -
  - Stamina to hold the stance both in foundation and at full draw.
  - Provision of power to draw the bow to full. Building bulk will limit certain movements and requires more resources, it improves bone density.
  - Freedom to aim – joint flexibility and the ability to inhibit certain muscle action
- Outcomes desired –
  - Sufficient power to easily draw the bow
  - Sufficient stamina to hold the shot
  - Sufficient mobility to allow for easy movement
  - Good resourcing.

Exercises

- Posture exercise – Alexander technique
- Abdominals – sit ups before rising.
- Mimic shooting and add resistance – to increase the strength.
- Little and often – the military only exercise in groups of 10 repetitions of any given exercise, but they do this 10+ times a day; this makes the usage "normal" for the body and it will develop to deliver this.
- Never more than 1 clear day between full exercise to improve – the body will return to providing enough to allow normal function – so decide on normal function.

"Muscle Memory"

- Repetition of the same action will "burn in" the nerve pathways that produce complex patterns of action.
- This automatic reaction releases the consciousness to process other critical tasks.
- It takes 10,000 repetitions to make an action habitual.

Lengthening to allow certain actions

- The long slow static stretches stimulate the stretch receptors in a muscle and begin to retrain the "normal" tone and length of a muscle.
- This takes the same amount of repeating as the habituation of learning as this is, in effect, what one is doing.
- This is useful in muscles that one requires to lengthen in order to make the shot.

Joint Mobility

- Any exercise that one undertakes is easier and more successful to achieve if the underlying joints are more flexible.
- A general stretching routine will help with muscles and with some joints.
- Mobilising exercises designed to take the ranges of motion in the spine and limbs to their end ranges in a controlled and deliberate manner, on a regular basis, will assist in keeping an even motion across the joints.
- Exercise routines such as Pilates and Yoga offer a structured way to achieve this.

Tissue Repair

- In the same way that muscle grows in response to exercise, and tears in the muscle will be stimulated to regrow and repair when exercised.
- Low resistance – just enough to know the muscle is being worked will assist in achieving this repair.
- For ligament injuries close to the surface the stimulus to repair should be applied daily and directly to the injury. This can be forthright in application but for a minimal time (10 secs is generally recommended by me) to trigger the acute response required to heal the injury but to avoid a major response that would be injurious. Tendons will not be helped by this method.

Opposition Muscles

- When a muscle contracts there is a neurological signal that inhibits the muscles that oppose the action you are taking.
- These “antagonist” muscles – if tight - will inhibit the free use of the desired muscle and limit the range of motion available.
- Stretching a muscle reduces its tone and thus the resistance to the primary movement.
- Stretching to allow ease in physical range does not reduce the ability or strength of a muscle to act at need (though some temporary reduction is noted immediately after stretching – see warm up and cool down later in the talk)

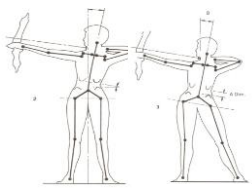
Antagonists to Drawing a Bow

- Neck muscles – that will alter good posture
- Lower back tightness and Psoas tension – allows for a forward rotation of the pelvis – that typical "bum out" pose of new archers.
- Pectoral Muscles and Serratus Anterior - preventing the retraction of the shoulder blade and extension of the shoulder joint.

In Summary

- Exercise the posture muscles for stamina
- Exercise the draw muscles for power and stamina in a balance
- Exercise the aiming unit for flexibility
- Stretch the Antagonist muscles to the full draw position to prevent hinderance.
- Repeatedly enhance the correct action and posture even if not shooting to "write" the neurological patterns desired so they act on "autopilot".
- Ensure good supplies of quality resources.

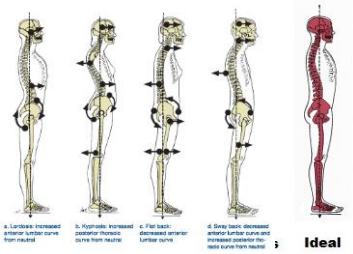
That's all very well on the flat – What about the hills?



Which one is best?

- The left hand one - base remains stable and the elevation works.
- The spine bends reducing the even symmetry of the shot and alters the balance of muscular power
- The lower ribs and pelvis become progressively squashed – add a belt….
- The right hand picture shows the pelvis swung in a side shift giving the elevation and not requiring the alteration of the spine or bow arm.
- This allows for all of the even application of forces and muscle actions.

Variations from the postural ideal

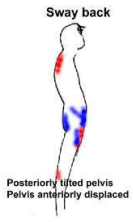


Addressing the Variations

- Add mobility
- Stretch muscles to activate them in posture holding – lengthen some and work others to achieve as close to the ideal as possible in that individual.
- Alter the Neurology to make the changes habitual
- Regular reinforcement to maintain the alterations.

Sway Back (Lordosis)

- Sway Back posture – caused by lax abdominals, tightness in Psoas
- Sway Back Posture – makes the lower back (Erector Spinae) muscles overwork, these are recruited to act and deliver the necessary power when the other muscles are too weak for the task. This leads to joint compression injuries and pain in the low back.



Exercises for Lordosis

- Abdominal / core strengthening
- Psoas Stretch
- Low Back Stretch
- Quadracep Stretch

Kyphosis

- Dowagers Hump – the kyphosis in the thoracic spine forces the chin and head to be carried forward of the ideal line – this leads to an increase in the upper triangle and loss of draw length, thus power in the shot and cast of the arrow.
- It over activates the neck muscles and disturbs the orientation of the scapulae risking shoulder injury – especially to the rotator cuff.

Exercises for Kyphosis

- Pectoral Stretch
- Alexander Technique
- Posterior Neck Stretch
- Body Centring and balance , exercises to heighten proprioception.

Some hindrances

- Spinal growth anomalies such as scoliosis and Sheurmanns disease will limit changes that can be made.
- Long leg syndromes will tip the archer forward or backward and may need built up shoes to regain balance. These are rare when seen without long bone fractures in the growing years but do exist. They are more common when seen as adaptations to pelvic (sacro-iliac) strains.
- Muscle wasting diseases or Stroke outcomes all affect how close to the ideal one may achieve.

Maintenance

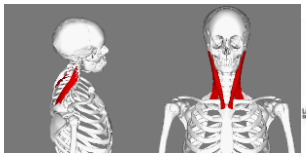
- Exercise
- Body Awareness – Proprioception Exercises
- Alexander Technique

Psoas and Lower Back Stretch

Note – the "tail" is tucked under – i.e. the backside is not stuck out.

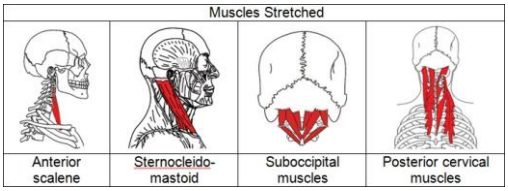
Rhythmical Knee to chest movements. Another "before rising" exercise

Neck Muscle Stretch



Never this one

Double Chin – for Posture



Pectoralis Major and Minor Stretch

- Core strength – to firm up the structure and reduce stresses on the torso.

Taking it too far

Maintenance - Exercise

- In physiological terms unless one is using the muscle continually then "normal" function is not being applied.
- With the rest of life getting in the way and for many Archery as a hobby, albeit a very involving one, the minimum one should be doing is a set of exercises every second day.
- Less frequent than this and the benefits will not only be lost as the new "normal" is established but take time to recover again once the routine is stepped up.

Maintenance - Body Awareness

- Most of the exercise forms and martial arts speak of "The Centre" or "The Core"
- This is usually given as the middle of the Sternum.
- In Western culture we are very head / logic centric so we tend to view ourselves as inhabiting a vehicle and sitting just behind our eyes.
- What is being put forward as the "Centre" is an idea of where to move from (for dance) where to solidify our defence (martial arts) or be our neutral position (sports).
- Knowing where it is in space and settling there is the basis of the Archery posture.
- Proprioception is the awareness of the joints in space. It is not balance and not tactile in nature.

Proprioception Exercises

- These are exercises that bring your awareness of where you are in space to the fore
- All of the centring and posture exercises will act as proprioception exercises
- To enhance this one can try holding the desired posture – either the general good posture or the adapted for archery posture – with the eyes shut. Be sure to have a support close to hand to begin with.
- Removing the reliance on some of the special senses will enhance your awareness of the proprioception input.

Maintenance – Alexander Technique

- Alexander Technique – practices and maintains a sense of ones centre and posture, it can make the "centre" your natural position.

Taking it too far

Warming up

- Prepares for exercise
- Moves blood from gut and resource storing to muscle and nerve and resource usage.
- Increases heart rate and therefore flow of supplies
- Increases breathing and therefore oxygenation
- Heightens nerve responses improving reaction times, finesse and dexterity.
- Improves joint lubrication to improve mobility

Warming Up - 2

- Is NOT stretching.
- It is light and increasingly vigorous or movements that mimic the actions to be taken with increasing resistance. For archers it is not just the shoulders but the chest, abdomen and neck as well.
- Sports researches have shown that with a Dynamic Warm Up performance improves and injuries are reduced. When using long and Static Stretches the injury risk was not improved over doing no warm up at all and performance was worse.

Warming Routine

- Gentle movements in a non resisted style that mimic the preparation for and delivery of a shot.
- Add resistance to this action to increase its challenge, light elastic cords are useful at this stage.
- Take a break but keep moving
- Return to, and increase, the resistance - switch to your bow to provide the resistance toward the end of the warm up.
- Between times at the shooting line keep the movements going thus keeping the warming effect – particularly if in a cold environment. Be prepared to re-warm the muscles if you have been still for as little as 5 minutes.

Cool Down

- This is to remove waste products from the muscles and resupply the tissue with the resting supplies it carries around against sudden need.
- It calms the nerve system and reduces the hormonal adjustments the exercise required to function at an enhanced level.
- Bodies work on Fight or Flight and the muscle carries a food reserve to allow it to act without waiting for digestion to supply the need. In effect the muscle has a larder that it can use from.
- At rest, the larder is restocked.

Cool Down

- Stretches and movement without, or with only minimal, resistance will promote drainage and allow space for the new supplies to enter.
- The stretches evacuate the area and the movement pumps in new supplies.
- Cooling down from anaerobic exercise should take as long as it takes for normal tidal breathing to return.
- Archery is an aerobic exercise and rarely induces oxygen debt. Use a similar time frame as the recovery time you would need from a sprint to inform you of your need. Failing that allow 10 minutes of stretching and moving to achieve the cool down.

Nutritional Considerations

- Nutrients for Energy Production
- Nutrients for Oxygen transport
- Altitude
- Hydration

Nutrition – For Energy

- Nutrients for turning Glucose and Fats into Energy in Krebs Cycle
  - Magnesium, Zinc, Vitamin B1, Vitamin B2, Vitamin B3
- And less likely but required nonetheless
  - Co-Q 10, A-Lipoic Acid, Potassium, Manganese, Biotin, Vitamin B6, Calcium.

Nutrition – For Oxygen Transport

- Iron, Vitamin B12, Vitamin B6, Folic Acid (B9), Copper, Vitamin A

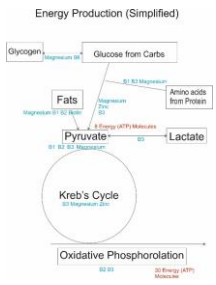
Energy Production

The diagram shows how ATP is produced. ATP is the "energy Molecule" that fuels the cells.

The key point in this system is Pyruvate and its conversion and introduction to Kreb's Cycle; up to this point only 8 energy molecules are produced, all without oxygen involvement.

If the body cannot do the conversion well or there is a lack of oxygen, pyruvate is converted to lactate – this makes the "fatigue ache" in muscles – that "tired ache" a lot of sugar will have been used for little outcome.

Add B_1 and Oxygen (a little more Magnesium, Zinc, B_2 and B_3) and 30 more energy molecules are made with the waste products of CO_2 and Water.



Altitude

- Shooting at altitude will lead to faster or greater fatigue due to lack of oxygen in the atmosphere and therefor in the bloodstream
- The body will adapt after a time with an increase in red blood cells. It stores a supply of red cells against the need of replacement and this store is mobilised against the need.
- To promote this in a shorter time frame than usual one must stress the body to act against a critical need
- Exercise more vigorously and at an altitude ideally twice the height you will be shooting at. Hopefully you will have travelled to the shoot several days in advance and climbing to the higher altitude each day for 2 days before shooting will speed the red cell release and thus allow you to increase the oxygenation again.

Hydration

- It is easy to note if you are dehydrated.
- Urine colour is ideally a very pale gold, if it is dark – drink, if it is water clear you've gone too far.
- Slow regular intake is required to use the colour as a guide – sudden large intakes will lead to a false loss of water as the time for the cells to take up the water will not have been allowed for.
- Muscle cramping is reduced by good hydration, adequate magnesium and ensuring that the blood does not pool in warmed up muscles that you do not cool down as well.

Self Care after Exercise

- Nutrition – see energy production and oxygen previously.
- Cooling down – to ensure adequate fuel resources are delivered back to the muscles to store against future need
- Hydration – it is easy to note if you are dehydrated. Urine colour is ideally a very pale gold, if it is dark – drink, if it is water clear you've gone too far.
- Muscle cramping is reduced by good hydration, adequate magnesium and ensuring that the blood does not pool in warmed up muscles that you do not cool down well.

Longer Term Care

- Make warmups and warm (cool)downs a normal part of your Archery
- Work on your Archery posture and centring.
- Make sure you get enough minerals vitamins and water to make the cellular energy work for you and transport the oxygen you will need.
- Little and often exercise will work better than once a week, build stamina and strength and stretch those that need to lengthen to allow easy movements to occur
- No more than 1 day off for any area you are wanting to build up.
- Visualisation – replaying a good shot routine over and over in the mind, especially at that point of going to sleep, will activate and firm up neurological pathways and will count toward practice.

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Thank You for listening

- Any Questions