No 35 The head-neck junction (I)

Gerald Foley CTC 20 January 2015

1. A question that keeps coming up is how much anatomy does one need to know to be a good Alexander teacher?
2. You certainly need to know some – but whether it involves knowing the names of vast numbers of bones and muscles is another question entirely.
3. In ArtsEd Penny O'Connor uses outline diagrams of the body and asks new AT students to draw on them the heart, lungs, liver and major organs. You would be surprised at what some people come up with – the lungs as small globes just below the ribs was one.
4. My own feeling is that a reasonable sense of how the body works is much more important than knowing where the stapedius muscle actually is or what it does. If you want the detailed anatomy, there are plenty of books and you can always look them up if you feel a need.
5. The one I like is called *Principles of anatomy and physiology* by Tortora and Grabowski[1]. Another one you may find useful is called *Atlas of skeletal muscles* by Stone and Stone. This treats every muscle separately on its own page.[2]
6. Today I am going to talk about the head-neck junction which is a matter of great interest to us as AT teachers. I have written a paper about it called *The special importance of the head-neck junction.* Have put it on my website and there is also a copy in the library.
7. Because this is such an important area of the body for us, if anyone has anything they want to explore further or if am not being clear please ask me.
8. Rudolph Magnus said "*The head leads and the body follows."* What we are talking about is the head-neck junction as the link between the control centre in the head and the rest of the body. It needs to be working properly.
9. Just imagine what it would be like to be driving an articulated lorry if the link between the cab and the trailer was broken or far stiffer than it should be.

[1] Tortora and Grabowski (2000)
[2] Stone and Stone (2000)

10. If our body is to work properly as an integrated psycho-physical mechanism, we must a well-functioning head-neck junction.
11. I have written a fairly long paper called "*The special importance of the head-neck junction"* which you can get to on my website. If you go to the website, you will see the link to the paper on the left side of the first page.
12. What I am going to do today and in the next talk is to go through the paper fairly quickly so that you can get hold the main points. You can then go back to it on the website if you ever feel the urge.
13. We will start with the basic anatomy of the head and the bony structure of the skull. The eight cranial bones form the cranial cavity which houses and protects the brain. The two maxillae that project forwards and downwards from the front of the skull, provide the underlying structure of the upper jaws, the lower part of the eye-sockets, the nasal cavity and the hard palate.
14. The mandibles, or lower jawbones, are the only moveable skull bones. They are hinged into the temporal bone of the skull at the temporomandibular joint just below the ear.
15. At the base of the skull. In the middle of the occipital bone, there is a hole or aperture, called the foramen magnum,. This where the connection between the spinal cord that runs down through the spinal vertebrae enters the skull and joins into the brainstem.
16. Projection down from the occipital bone, to either side of the foramen magnum, are two curved bony projections known as the occipital condyles that form a rocker joint with the top cervical vertebra which is known as the atlas. In Greek mythology, Atlas carried the world on his shoulders.
17. The next cervical vertebra is called the axis. It has an upward toothlike projection, called the dens, which fits into a hole in the atlas. This ensures that when the head turns, the top two vertebrae move together imposing a twist on the whole cervical spine.
18. The support point for the head, where the occipital condyles rock on the atlas vertebra, is surprisingly high in the head. The atlas vertebra is located approximately mid-way between the openings into the ears.

19. Evolution has placed the centre of gravity of the skull slightly in front of the occipital condyles so that it is subject to a constant tendency to tip forward. In order to counteract that, a small degree of tension is required in the muscles in the back of the neck. This is automatically or reflexly provided by the nervous system.

20. So we do not need to pull our head back for our eyes to be in their resting position looking horizontally straight forward. It will happen automatically if we allow it.

21. The upper part of the brain, the cerebrum, is housed in the upper area of the cranial cavity. This is where the brain's cognitive functions take place. These hemispheres wrap down and round the lower brain.

22. The cerebrum is divided into the two cerebral hemispheres with their much discussed differences between the contributions of the right and left. Towards the back of the cerebrum are found the visual centres.

23. Below the cerebral hemispheres are various parts of the brain. The number of these special parts is growing all the time as brain-scanning and imaging techniques become increasingly sophisticated.

24. We do not need to get into any of the details. For our purposes the brainstem which joins into the top of the spinal cord is where Magnus located the postural control centres.

25. The lower part of the brainstem is called the medulla oblongata, the middle part is called the pons which forms a bridge to the cerebellum, and the upper part is called the midbrain. Another structure that is often mentioned is the thalamus which is above the brainstem

26. What brain imaging is finding in increasing detail is that the various structures in the brain receive and respond to the various sensor systems around the body. These include the muscle spindles, the pressure sensors in the joints and those in the skin and the soles of the feet, and the tiny individual muscles separately supporting each of the body's hairs.

27. The head also provides a platform for the sensors that monitor the external world, often referred to as the distance receptors or exteroceptors. In humans the most important of these are the eyes but other animals may rely more on the nose and ears.

28. The head also houses the labyrinths, the body's balance and head-movement monitors which are found deep in the inner ear.

29. The average weight of the head is around four kilograms (8½ lbs). Lifting and carrying two bags of sugar or four bricks is a useful exercise in that it gives a tangible idea of the task involved in supporting and adjusting the skull on top of the cervical spine. When everything is working properly, it is a task the neuromuscular system handles with such untiring and delicate precision that we never notice it.

30. Below the head is the neck. This is reputedly the most complex musculo-skeletal system in the body.[3] Its bony structure is a continuation of the spinal column, rising out of the trunk in the form of the seven cervical vertebrae which form the cervical spine.

31. The neck has thirty-seven separate joints and is in a state of constant movement. It is said it moves over six hundred times an hour, whether the person is awake or asleep.[4]

32. The cervical spine is supported by an elaborate arrangement of muscles. The scalenus (ladder) muscles run from the two upper ribs and connect the transverse processes of the cervical vertebrae, assuring their relationship with each other and stabilising the cervical spine as a whole.

33. In the layer of muscles outside the scalenus are found the larger muscles which attach to the head and provide it with its various rotatory, flexion and extension movements; these muscles include the sternocleidomastoids, the trapezius, the platysma and the levatores scapulae.

34. The whole structural arrangement depends on each muscle having precisely the right amount of tone, or tension, at all times to play its own particular part in the adjustment of the head-neck relationship from moment to moment.

35. Most of the twisting and other movements that people often attribute to the neck occurs in the head-neck junction. The neck contributes a certain amount of flexibility but its main role is to provide support and stability for the head. What we think are neck movements are the layers of skin and muscle attached to the skull being pulled in different ways as the head moves.

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[3] Bland and Boushet (1992)p135
[4] Ibid.135

36. In the overall scheme of the body, the head-neck junction is one of the four main hinge points. The others are the ankles, knees and hips. They all play a part in our normal movements.

37. If we have a stiff head-neck junction, the head is not able to play its part as a delicate counter-balance when we are using our body.

38. We can explore that by making various movements with a stiff neck and a free one.

39. You may wonder about what goes on when people are required to keep the neck and head quite still. Or if they have to use a microscope. It is also the case with various kinds of dances, most noticeably classical ballet. Do not these activities interfere with the head-neck relationship?

40. Of course they do. So also does brushing one's teeth or delicately adjusting the eyebrows with a small brush.

41. No one says that we should not stiffen our neck when we need to do so. Similarly no one says we should not narrow our chest and bend our head forward if we are doing some near work that requires this.

42. The problem comes when we do not stop the stiffness or distortion when the activity is over and allow our neck to be free again.

43. I like looking at a squirrel eating a nut. It pulls itself down, narrows its chest and tightens its neck until the shelling and nibbling job is done. Then it throws away the shell, opens itself up, lengthens and widens in the front and goes looking for the next piece of food.

44. The important point is that the head neck junction is not kept stiff. It is sufficiently free to allow the postural reflexes to make the necessary adjustments to the position of the head to keep our musculature working in a smooth and efficient way as we go about our daily lives.

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