No 8 More about breathing

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1. Last time we were looking at the physiology of breathing. This is the process by which we take air into the lungs where it exchanges oxygen for carbon dioxide. Breathing, also called respiration, is absolutely essential to keeping our tissues alive and functioning properly.
2. What I am going to do today is look at the basic mechanics of ordinary breathing. This is the kind of breathing we should be doing when we are sitting, walking, talking and generally getting on with things.
3. In this, we are quietly and completely unconsciously, taking air in mainly through our nose and quietly breathing it out again. I mention taking the air in through the nose since it is much kinder to the lungs because as it passes through the nasal passage the air is warmed and dust and other pollution are filtered out. It is the way we should generally be breathing.
4. If we are habitually breathing in this way, it provides us with a baseline to which we automatically return after we have finished the specialised forms of breathing we have to use for our Wagner singing, tuba playing or other specially demanding activities.
5. It is also worth remembering that breathing was very much a concern of Alexander's and it was as a teacher of proper breathing that he first made his name. He never wavered in his belief in the importance of breathing properly. When he published MSI, Part III consisted of a reprint of a pamphlet he first published in 1907 entitled *The theory and practice of a new method of respiratory education.* He is still coming back to the same theme at various places in his last book, CCCI.
6. For the talk, I am going to use this plastic model of the thorax which I had specially made for the occasion. You can see the outline of the ribs and the diaphragm at the bottom. The olive oil label is the sponsor's logo which helps offset the costs.
7. We can see that if we decrease the volume of the container by squeezing it, the air flows out. If we then allow the container to expand back to its original volume, the air flows back in.
8. Notice the only work that has to be done is concerned with altering the volume of the container. We squeeze it to reduce its volume and its natural springiness brings it back to its

original volume and when that happens the air just flows back in of its own accord.

9. This is what happens with the thorax. We use our muscles to reduce its volume and when we allow it to expand again, the air flows back in without any effort or sucking.

10. One way we can interfere with the breathing process is by constricting the passage through which air flows in and out of the lungs. If I squeeze the model and then block the inlet, it cannot expand back to its previous volume. If I just allow some air to sneak in, we can hear a slight noise which, if we think about it, is like when we sniff air in through our nose.

11. We can carry out the same experiment on ourselves. If we breath out and block our nose and mouth so the air cannot come in, we cannot expand the chest. But once we unblock the air inlet, allowing the air to come in, we are able to expand the thorax again.

12. As long as we have a clear opening between inside and outside, the air flows freely in and out as we expand and contract the thorax.

13. The point to remember is that, in breathing, just as in the model, the forces involved are entirely to do with changing the shape of the thorax and have nothing to do with pushing the air out or sucking it in.

14. The next thing we want to look at is the mechanics of how we contract and expand the thoracic cavity – the chest. This is a very complex issue and we venture into it at our peril. But it is not a bad idea to have a general idea of what is happening.

15. So what I am going to do is try to give you a broad description of what is going on as we expand and contract the thoracic area. The two most important elements in this process are the ribs and the diaphragm.

16. The ribs first. They are fixed into the spinal vertebrae but they have a certain amount of freedom to rotate up and down. The common analogy is with the handle on a bucket. When the ribs come upwards towards the horizontal, the volume they enclose is increased and the air comes in. When they go back down, the volume is decreased and the air goes out.

17. The other major element in breathing is the action of the diaphragm. The diaphragm is a more or less dome-shaped sheet of muscle and connective tissue separating the thoracic

cavity from the abdomen. When the diaphragm tightens, it flattens downwards.

18. In normal breathing, two things happen together. The diaphragm flattens at the same time as the ribs are folding upwards so that both are contributing to the increase in volume in the thoracic cavity.

19. The lungs more or less fill the thoracic cavity and are attached to it by the pleural membrane. So when the thoracic cavity expands, so do the lungs and the air flows into them.

20. In the out-breath, the ribs are folding downwards and the diaphragm is relaxing and moving upwards, both of which are decreasing the volume of the thoracic cavity.

21. These are the basic things that happen, but the actual reality and especially the timing of how they happen is quite complex.

22. When I was preparing this talk, I looked up breathing in the recent edition of Gray's Anatomy (p819). At the end of a long and very complicated description of goes on when we breathe in and out, it says: *In summary, breathing is a complex and highly orchestrated neuromuscular activity, about which there is still much to be learned. That knowledge is unlikely to be acquired by the study of individual muscles in isolation.*

23. It is not just the job that each muscle does that it is important. We also have to take into account the timing or the dynamics involved in breathing in and out in a relaxed and natural way.

24. When some muscles are reaching their maximum contraction, others are reaching their maximum extension and everything in between – and all in harmony. The word orchestrated used in *Gray's Anatomy* is well-chosen.

25. Alexander did not have the detailed knowledge of the breathing mechanism that we can get from modern editions of *Gray's Anatomy* but he did have a clear idea of how people disrupt their breathing.

26. One of the faults he particularly singled out was what he called "sniffing" – taking air noisily in through the nose. He was also very condemning of breathing exercises, especially the practice of "taking a deep breath". I find it astonishing how prevalent the exact same faults pointed out by Alexander still are today.

27. If we ask someone to take a deep breath, we almost invariably find they tighten their chest muscles, which prevents their thorax from expanding. They also tighten their stomach

muscles which prevents the diaphragm from descending and increasing the volume of the thoracic cavity.

28. If they are really trying to get as deep a breath as possible, they also tighten their nose and face muscles which constricts the air passages and reduces the inward flow of air through them. The sniffing we hear is the air-flow being constricted as we found when we were experimenting with our model thorax.

29. The overall effect of “trying” to take a deep breath is to set up the conditions under which we use maximum effort to take a breath which is considerably shallower than we would do if we were not thinking about it. Yes, we are taking air in, but we are making it as hard as we can for ourselves and achieving less than if we took a normal breath.

30. Proper breathing is not something we can either learn or teach directly. As Walter used to say, if you are <u>doing</u> anything about your breathing, you are probably making it worse.

31. In breathing, as in so much else, our starting point as AT teachers is not in the doing but in the not-doing. Our task as teachers is to stop ourselves and our pupils from doing the things that are harmful. If we can succeed in that, we have given the right things a chance to happen.