A Connection Between a Bit in the Horse's Mouth, A Throttled Throat & Waterlogged Lungs

by Robert Cook FRCVS., PhD

Imagine you are a day-old horse egg. In time, you will develop horsey features such as big eyes and a long face. But, in your early days, you will not look any different from the embryos of other mammals, including humans. In other words, you share a basic blueprint common to all mammals. Even as an embryo, your throat will be a cross roads for two tubes, one for food and one for breathing. At your front end, your mouth (food tube) will be below your nose (breathing tube) and, in your neck, these positions will be reversed; your gullet will be above your windpipe (trachea).

Once born and, depending on need, your throat will automatically adjust its shape for either eating or running. Food and water flows from mouth to stomach and air flows from nose to lungs and back again. Think of your unusually long soft palate as a switch plate: "up" for eating and "down" for exercising. Like the rabbit, the horse cannot breathe through its mouth. It is a 100% nose-breather.

All photos courtesy Dr. Robert Cook

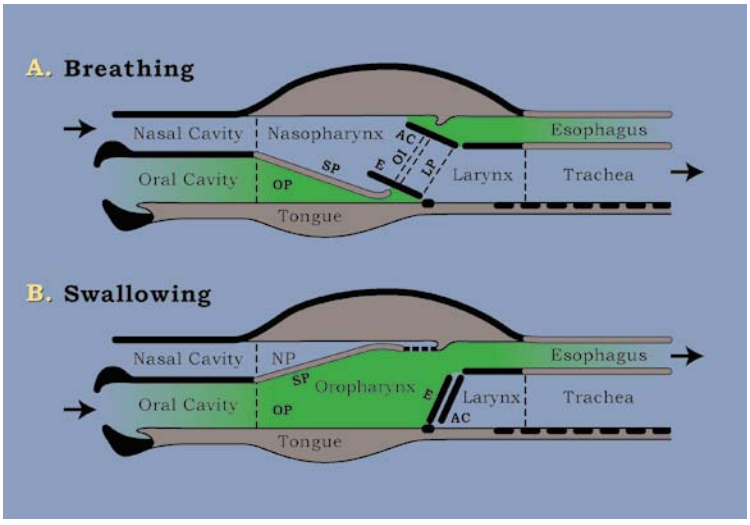

Figure 1A & 1B: Showing how the soft palate and other structures in the throat (nasopharynx and oropharynx) act as switch plates enabling this segment of the airway to serve for either breathing or swallowing.

Key: AC = arytenoid cartilages (the 'flappers'); E = epiglottis; LP = laryngopharynx (grass channel); OI = ostium intrapharyngium ('button-hole'); OP = oropharynx; SP = soft palate

Now imagine you are a full-grown horse, living-free on some savannah. When you run, your lips are sealed, your mouth dry and your tongue immobile. It is my belief that, when running, there will be a partial vacuum in your oral cavity and that this is crucial for maintaining your unobstructed airway (Fig.2). Like the adherent sides of an unopened trash bag, an oral vacuum "sticks" the tip and body of your tongue to the roof of your mouth (the hard palate) and the root of the tongue to the soft palate. The vacuum is created easily and economically by one swallow prior to exercise, and "locks-down" your soft palate. The oral cavity shrinks and becomes a potential space only, as does the oral part of the throat. When running, you breathe freely because the space previously occupied by the oral part of your throat (oropharynx) enlarges the respiratory part of your throat (nasopharynx).

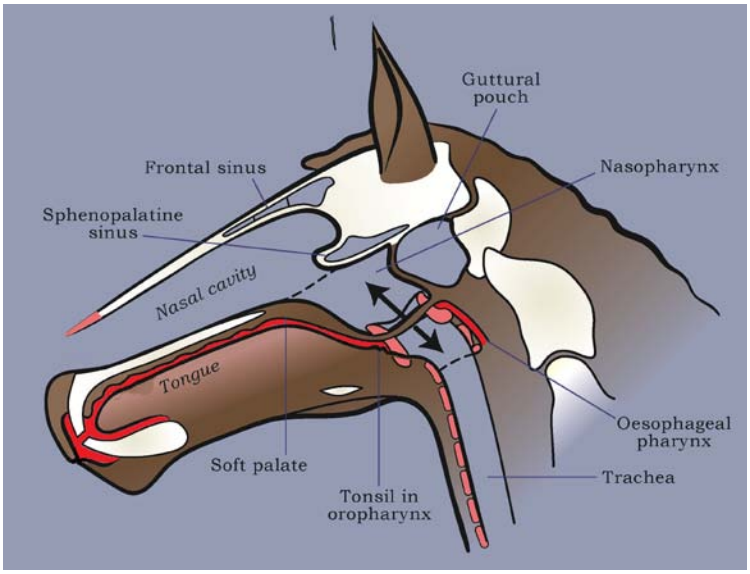

Figure 2: Showing the configuration of the throat for running. The lips are sealed and the red areas represent the oral vacuum locking-down the soft palate on the root of the tongue and closing the entrance to the gullet. The double-ended arrow represents airflow between throat and voice box.

But what if you are a racehorse and run with one or more bits in your mouth and, very often, with your tongue tied to your lower jaw? Even one bit breaks the lip seal, allows air into your mouth and destroys your oral vacuum. Because your soft palate is not "locked down," it is free to blow about like a wet blanket in the stiff wind that, at a gallop, roars backwards and forwards through the chasm of your throat, two and a half times every second. The term palatal instability (PI) describes the change but not its effect. Your palate may even become unbuttoned from your epiglottis, as in Fig. 1B and Fig. 3—a change called "dorsal displacement of the soft palate" (DDSP). The terms PI and DDSP are "polite" descriptions of changes that throttle, choke, strangle, suffocate & asphyxiate.

PI, with or without DDSP, has a cascade effect on the lungs. Your desperate attempts to breathe-in against a choked airway inflicts suction pressure bruises on your lungs at every breath, 150 breaths/minute. This is the same mechanism by which suction on human skin raises a bruise, as in a hickey. Instead of your lungs being light, dry and fluffy, like a soufflé, they become heavy, wet and solid, like a pudding. Blood-stained fluid floods your lungs and some is sucked into your small airways. Your "waterlogged" lungs no longer provide enough oxygen, and you tire prematurely. You experience intense chest pain, feel as though you are

95% of racehorses "bleed" from the lungs. Since the 1970s, the disease has been called Exercise-Induced Pulmonary Hemorrhage (EIPH) but it is not a good name for a disease that is neither exclusive to exercise, nor a true hemorrhage.

All photos courtesy Dr. Robert Cook

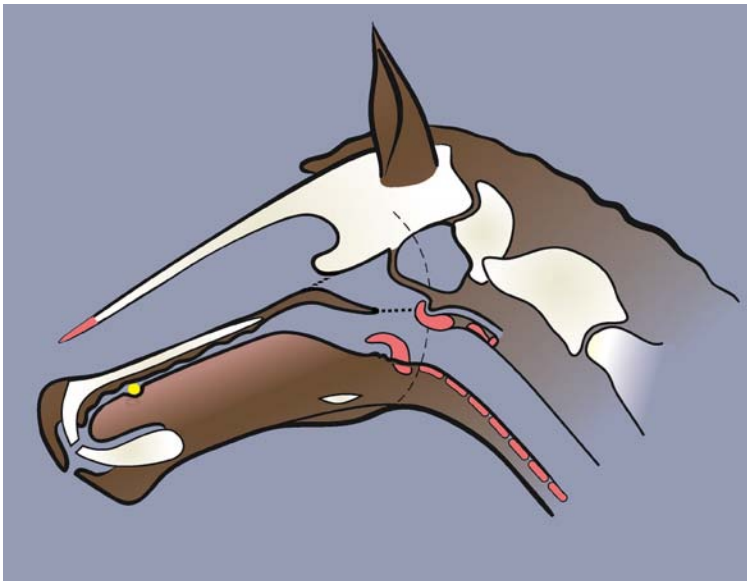

Figure 3: Showing how the bit allows air to enter and inflate the oral part of the throat, causing the soft plate to rise and reduce the respiratory part of the throat to a bottleneck marked front and back by the broken lines. A suffocated horse has to work harder to breathe and its lungs become waterlogged.

drowning, become frightened and, understandably, you slow down.

Because they are herd animals, most bitted and tongue-tied horses will try to stay with the pack and finish the race. But because of asphyxia, exhaustion and muscular weakness, some will strain tendons and ligaments ("breakdown"); some will fall and break a leg or dislocate a joint; and a few will die. Those that survive the race may, when they drop their head to drink, drain blood-stained fluid from both nostrils and will **appear** to have had a "nosebleed."

95% of racehorses "bleed" from the lungs. Since the 1970s, the disease has been called Exercise-Induced Pulmonary Hemorrhage (EIPH) but it is not a good name for a disease that is neither exclusive to exercise, nor a true hemorrhage. Lung "bleeding" in the horse is—in my opinion—the same disease as a well-documented but rare emergency in human medicine called Negative Pressure Pulmonary Edema (NPPE) and should carry the same name. An internet search for NPPE will reveal the similarities and provide more information. In man, NPPE most often occurs when, during a general anesthetic, a patient's airway is accidentally obstructed.

In the horse, NPPE is predominantly bit-induced. Sadly, use of a bit is mandated by a centuries-old rule of racing. Administrations in general could remedy this by offering a choice of something better for racing, dressage, and all those disciplines in which this archaic and dangerous device is currently mandated. In so doing, they could bring about a renaissance in horsemanship and vastly improve the quality of life of every horse.

AS A BONUS:

- having removed the primary cause of "bleeding," Salix will no longer be needed
- the frequency of accidents and injury to horse and rider will be reduced
- the working life of horses will lengthen and less wastage will occur
- much will have been done to boost the public image of horse sports
- wagering on racing might regain popularity
- performance in all disciplines will improve; racehorses will run faster

Further reading

Cook, W.R (1999): "Pathophysiology of Bit Control in the Horse." *Journal Equine Veterinary Science* 19:196-204
http://www.bitlessbridle.com/pathophysiology.pdf

Cook, W.R. (2002): "Bit-induced asphyxia in the horse: Elevation and dorsal displacement of the soft palate at exercise." *Journal of Equine Veterinary Science*, 22, 7-14
http://www.bitlessbridle.com/Article-6.pdf

Cook, W.R. and Strasser, H (2003) *Metal in the Mouth: The Abusive Effects of Bitted Bridles*. Sabine Kells, Qualicum Beach, BC Canada

Cook, W.R (2011): "Damage by the bit to the equine interdental space and second lower premolar." *Equine Veterinary Education*, 23, 355-360
http://www.bitlessbridle.com/DamageByTheBit.pdf

Cook, W.R. (2011): "What Causes Soft Palate Problems and Bleeding in Racehorses? The answer is on the tip of your horse's tongue." *Horses For Life*, Volume 62
http://www.bitlessbridle.com/SoftPalateAndBleeding.pdf

Cook, W. R: (2013): A method for measuring bit-induced pain and distress in the ridden horse." *Proceedings of the International Society of Equitation Science Conference*. Available at
http://www.bitlessbridle.com/MEASURING%20BIT-INDUCED%20PAIN2013.pdf

About the author: *Robert Cook is Professor of Surgery Emeritus, Tufts University, Cummings School of Veterinary Medicine, Massachusetts, and Chairman of BitlessBridle Inc. Contact him at telephone: (443) 282 0472, email:* ***drcook@bitlessbridle.com*** *or visit his website at* ***www.bitlessbridle.com***