Bitting: The Inside Story

Study examines bit action and its effects on the horse's mouth

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The use of a bit is mandatory in dressage competition, and every rider is faced with the challenge of selecting an appropriate bit for his or her horse. Because the bit contacts sensitive structures within the horse's oral cavity, improper selection, fitting, or use of a bit is likely to cause resistance to the action of the rein or even injury to the horse's mouth. Areas where the bit crosses a bony surface, such as the hard palate and the bars of the mouth, are particularly vulnerable to painful pressure from the bit.

Tack stores carry a wide range of bits—some familiar, others novel and different (and not all legal for use in recognized dressage competition). In recent years, bits have been designed with the intention of making the horse more comfortable, rather than as a means of increasing the rider's control, which is certainly a positive step. Unfortunately, there is limited information to help riders choose appropriate bits for their mounts.

In an effort to introduce some science into the art of bitting and bit selection, researchers in the McPhail Center have recently completed a series of studies of equine oral conformation and bitting. In this article, I'll describe the position of various bits in the horse's mouth and their relationships to the sensitive structures. A future article will explore the movements of the bit within the oral cavity.

Oral Anatomy

Within the horse's oral cavity, the bit rests on the tongue and the gums overlying the bars of the mandibles. The hard palate, which forms the roof of the mouth, bounds the oral cavity above. The tongue normally fills the oral cavity, and the bit is interposed between the soft, muscular tongue and the bony, hard palate. When the horse accepts the bit, the muscles of the tongue relax, allowing it to be indented by the bit, thereby relieving bit pressure against the palate.

Oral Conformation

Horses differ in the sizes and shapes of their oral cavities, and these differences dictate the mouthpiece types and sizes that can be accommodated comfortably. Factors to consider include the position of the corners of the lips relative to the bars, the width across the jaw between the corners of the lips on the left and right sides, the shape of the palate (flat or arched), and the thickness and width of the tongue.

The first part of our study used x-rays to measure some internal dimensions of the horse's oral cavity. The goal was to determine whether mouth size was proportional to horse size. The subjects were four warmbloods and four Thoroughbreds. The height and length of each horse's oral cavity were measured radiographically, and these dimensions were correlated with the horse's height at the withers. The results showed no relationship between a horse's height and the size of his oral cavity. In practical terms, this finding indicates that we cannot assume that a large horse should wear a bigger bit than a smaller horse.

A Study of Bit Position

Bits vary in size, shape, and mechanics of action. Most riders are aware that individual horses respond better to certain bits, and that these preferences may be related to differences in oral conformation or to the horse's sensitivity to the mechanism of action. Our subjective judgment of the horse's response is the main criterion used to select an appropriate bit for an individual horse.

The goals of our second study were to describe the position of different types of bits inside the horse's mouth and to measure their proximity to the horse's hard palate and premolar teeth, both of which are readily identified on radiographs. The eight horses from the previous study were fitted with a snaffle bridle that was adjusted to produce two small wrinkles at the corners of the lips.

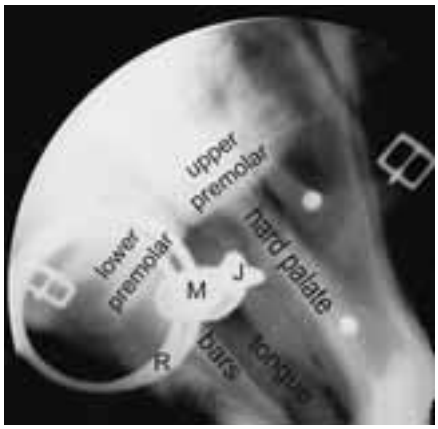

FIGURE 1. Lateral-view radiograph of a horse's head. The horse is facing to the right. The buckles are for the flash noseband, and the two white dots are metallic markers taped to the horse's skin to calibrate the distance measurements. The horse is wearing a single-jointed, loose-ring snaffle. The parts of the bit are labeled R (rings), M (mouthpiece), and J (joint). Note the shape of the joint and its proximity to the palate.

A flash noseband was fitted snugly but not tightly enough to indent the skin.

We studied the following four bits: a loose-ring, single-jointed snaffle; a Baucher; a KK Ultra; and a Myler comfort snaffle. The width of each mouthpiece was equal to or up to 0.5 cm wider than the horse's mouth, and the mouthpieces were the same thickness at the point at which they crossed the bars of the mouth. We took two radiographs each of the four bits: with the reins loose, and with equal tension applied to both reins.

Loose-ring jointed snaffle. The single-jointed snaffle bit (Figure 1) was positioned with the arms of the mouthpiece hanging down toward the incisor teeth, as indicated by the fact that the mouthpiece rotated around the ring to the four o'clock position rather than being in the middle of the ring at the three o'clock position. The sharply curved profile of the joint in the middle of the mouthpiece protruded toward the horse's palate. The loose ring allowed the mouthpiece to rotate freely, so the horse could use his tongue to move the mouthpiece into different positions, perhaps as a means of changing the areas under pressure.

When tension was applied to the reins, the mouthpiece pressed more deeply into the tongue, thereby causing the joint to move away from the palate. Single-jointed bits are usually described as having a nutcracker-like action, the implication being that when tension is applied to the reins, the angle between the arms of the mouthpiece closes and the joint is pushed toward the palate. In our study, any nutcracker effect that tended to push the joint toward the palate was more than offset by indentation of the tongue.

Baucher. The Baucher snaffle also has a single joint, but its mechanics are different from those of the loose-ring

FIGURE 2A. Baucher snaffle.

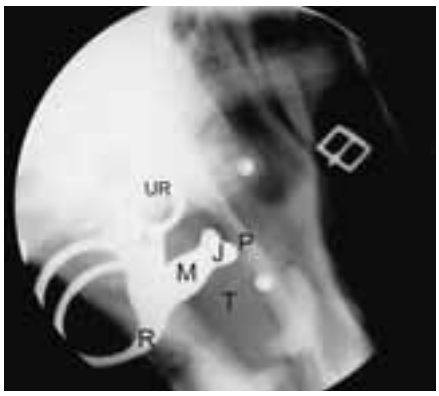

FIGURE 2B. Lateral-view radiograph of a horse's head with Baucher bit in place. Labels are P (palate), T (tongue), UR (upper ring, for attachment of cheekpiece), R (lower ring, for attachment of rein), M (mouthpiece), and J (joint). Note the higher position of the mouthpiece on the horse's tongue as compared to the loose-ring snaffle (Figure 1) and the proximity of the joint to the palate.

snaffle because of the method of attachment to the bridle cheekpieces and the reins. With a Baucher, the cheekpiece attaches to a small upper ring that does not allow the mouthpiece to rotate around it. Consequently, the mouthpiece is fixed in a more elevated position on the horse's tongue than the loose-ring snaffle. In this position, the bit's joint is adjacent to the horse's palate and the mouthpiece has relatively little mobility, so it is difficult for the horse to move the bit to relieve pressure on sensitive structures.

KK Ultra. The loose rings of the KK Ultra snaffle allow the mouthpiece to rotate downward. Because the central link is oriented at an angle to the mouthpiece, the downward rotation of the mouthpiece brings the smooth surface of the central link adjacent to the palate. The central link was located farther from the palate than the joints of the single-jointed bits. Rein tension moved the entire mouthpiece of the KK Ultra away from the palate by compressing the tongue, and the central link rolled upward over the surface of the tongue as rein tension increased. The relatively large separation between the central link of this bit and the palate, combined with the smoothness of the surface of the link, may explain why many horses appear to be comfortable and perform well in this bit.

FIGURE 3A. KK Ultra snaffle.

FIGURE 3B. Lateral-view radiograph of a horse's head with KK Ultra in place. Labels: P (palate), T (tongue), R (ring), M (mouthpiece), and L (central link). Note the smoothness of the surface of the central link facing the palate.

Myler comfort snaffle. A wide range of Myler bits is available. One of the bits evaluated in this study was the Myler comfort snaffle. As shown in Figure 4a, the two arms of the mouthpiece meet within a central barrel that allows a swiveling motion but does not permit any nutcracker action. The radiographs showed that the mouthpiece was positioned quite high on the horse's tongue and tended to be pressed deeply into the tongue, indicating that the tongue muscles were relaxed. The position and angle of the Myler mouthpiece did not change when tension was applied to the reins, but the bit moved away from the palate by further indenting the tongue.

FIGURE 4A. Myler comfort snaffle.

FIGURE 4B. Lateral-view radiograph of a Myler comfort snaffle in place. Labels are P (palate), T (tongue), R (ring), M (mouthpiece), and B (central barrel). Note that the surface of the barrel facing the palate is smooth and that the bit is pressed deeply into the tongue, even without any tension on the reins.

Some horses that resist the action of conventional bits perform well in a Myler bit. This increased acceptance may be related to the smoothness of the surface of the barrel, the higher position of the mouthpiece on the tongue, the fact that the angle of the mouthpiece does not change when tension is applied to the reins, or all three. Another possibility is that the relatively rigid Myler mouthpiece allows the horse to push against it with his tongue to control pressure on the bars.

Choosing a Bit

The results of our study indicate that the size and shape of the oral cavity vary among horses, and that these differences are likely to affect each individual horse's comfort with different types of bits. In my next article, I'll look at how the horse can use his tongue to change the position of the bit.

MEET THE EXPERT

Hilary Clayton, BVMS, PhD, MRCVS, is a world-renowned expert on equine biomechanics and conditioning. Since 1997, she has held the Mary Anne McPhail Dressage Chair in Equine Sports Medicine at Michigan State University's College of Veterinary Medicine, East Lansing. The position focuses on dressage- and sport-horse-focused research.

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