What causes saddle slip?

Sue Dyson & Line Greve

The tendency for a saddle to persistently slip to one side is a well-recognised problem in sports horses. It can occur for a variety of reasons, including asymmetry in the shape of the horse's back, riders sitting crookedly and ill-fitting saddles. This historically has encouraged owners to try changes in flocking, multiple saddles, numnahs and additional padding to try to diminish the saddle slip, but this has not always been effective. Saddle slip can cause abnormal wear of the hair or transient swellings under the saddle. A saddle which slips to one side can induce pain and impair performance, therefore identification of the underlying cause has important welfare implications.

At the Animal Health Trust (AHT) we have historically observed that in association with hindlimb lameness, saddles may slip consistently to one side. Abolition of lameness by diagnostic analgesia (nerve blocks) has also abolished saddle slip, implying that hindlimb lameness can induce saddle slip. We performed a prospective study from August 2011 to August 2012 aiming to improve our understanding of the relationship between saddle slip and hindlimb lameness. Our study included 128 horses, all ridden by at least two riders. This included both sound and lame horses. Seventy-one horses had hindlimb lameness, 38 [54%] of which had saddle slip when ridden by at least two riders. Thirty-seven out of 39 horses [97%] had saddle slip abolished when lameness was eliminated by diagnostic analgesia, verifying a causal relationship. In two horses the saddle continued to slip after resolution of lameness. Both horses had asymmetrically flocked (stuffed) saddles and when ridden with correctly fitting saddles, no saddle slip was apparent.

The normal riders of five horses sat crookedly and could potentially have induced saddle slip. However, a similar degree of saddle slip was seen when ridden by riders from the AHT, who all sat squarely when riding a variety of different horses without saddle slip. Those riders who sat crookedly tended to collapse consistently to one side and draw up their leg on the opposite side. One of the five riders who sat crookedly had sustained previous injuries and was aware of her crookedness, but the other riders were unaware, despite undergoing regular training. This indicates that trainers should perhaps pay greater attention to rider position. Assessment of the rider by a physiotherapist may also be helpful to address any physical problems that may predispose to crookedness.

We assessed symmetry of the back using a Flexible Curve Ruler and compared horses with and without saddle slip. Curiously there was a greater degree of asymmetry in horses without saddle slip than in those horses which did have saddle slip. This indicated that in this population of horses asymmetry of the back was unlikely to contribute to saddle slip.

This study showed that saddle slip occurs in a high percentage (>50%) of horses with hindlimb lameness. Saddle slip may actually highlight the presence of low-grade and subclinical hindlimb lameness. Saddle slip is usually blamed on saddle fit and horse shape. Our findings emphasise the need for education of owners, veterinarians, physiotherapists, trainers, riders and saddle fitters that saddle slip is frequently an indicator of lameness, not necessarily a manifestation of an ill-fitting saddle, asymmetric shape of the horse's back or rider crookedness. It appears that saddle slip as a manifestation of hindlimb lameness has previously been underestimated.

We extended the study to a survey of 506 sports horses in normal work. Thoracolumbar shape/symmetry were measured at predetermined sites using a flexible curve ruler. Saddle fit

and fit of any pads or numnahs were assessed. All horses were assessed trotting in hand and ridden by the usual rider. The presence of lameness (in-hand and/or ridden), saddle slip and crookedness of the rider was recorded. Statistics were performed to assess the relationship between horse-saddle-rider factors and saddle slip.

The frequency of lameness, quadrilaterally reduced cranial phase of the stride or stiff, stilted canter was 45.7%. Saddle slip occurred in 12.3% of the horses. There was major left-right asymmetry of back shape in 0.6% of horses. One hundred and three of 276 riders (37.3%) sat crookedly. The saddle consistently slipped to one side in 30.3% of horses with hindlimb lameness, compared with 5.4% with forelimb lameness, 17.4% with stiff, stilted canter, 20% with quadrilaterally reduced cranial phase of stride and 5.6% non-lame horses. Nineteen horses (30.6%) with saddle slip had no detectable hindlimb lameness, however 14 had a gait abnormality, particularly in canter, for example crookedness, four-time canter, quality of canter worse on one rein compared with the other; or placing the hindlimbs unusually close together. The saddle had uneven contact in 93 horses (18.4%) and was unbalanced in 166 horses (32.8%).

Statistical analysis revealed that saddle slip was significantly associated with hindlimb lameness and gait abnormalities, with a risk of 52.6 times odds. This proves that hindlimb lameness is the most important cause of saddle slip. Paradoxically a saddle fitted with even contact and uniform flocking was more likely to slip (15.5 times the odds) than an ill-fitting saddle; similarly a well-balanced saddle was more likely to slip (3.1 times the odds) than an unbalanced saddle. Saddles that bridge are more likely to be held in a fixed position than a well-fitting saddle.

This study revealed a startling frequency of lameness in the general sports horse population. Clearly many horses with hindlimb and/or forelimb lameness go unrecognised. This study reinforced our previous observations that saddle slip may be a sign of hindlimb lameness. It appears that saddle slip as a manifestation of hindlimb lameness has previously been underestimated. Many horses with hindlimb lameness go unrecognised and early recognition of lameness is important for appropriate treatment and rapid return to work. Detection of saddle slip provides an opportunity for the owner, riders and trainers to detect low-grade and subclinical lameness, with important welfare consequences.

Exercise-induced changes in back dimensions: the influence of saddle-fit, rider-skill & work quality

Sue Dyson & Line Greve

Recommendations concerning saddle-fit are empirical and based on anecdotal information. We know that the saddle needs to fit the horse in motion, but there has been no investigation of whether the thoracolumbar region changes in shape in association with exercise, or how improper saddle-fit may influence potential changes.

The aims of the study were to investigate exercise-induced changes in back-dimension in sports horses of variable age, from a range of work disciplines, working at different levels. The objectives were to 1) quantify changes in back-dimension that occur subsequent to ridden exercise 2) determine the influence of work-quality 3) determine the influence of saddle-fit 4) determine the influence of rider skill-level. We hypothesised that: 1. changes in back-dimension immediately after exercise were quantifiable; 2. horses working 'on the bit' would have larger changes than horses not working 'on the bit'; and 3. an ill-fitting saddle before work would diminish any transient enlargement of the back muscles with work.

Sixty-three sports horses in normal work were assessed prospectively. Thoracolumbar shape/symmetry were measured at predetermined sites before and immediately after a 30 minute exercise period; width ratios for two levels at each site were calculated. The work-quality and rider-skill were graded; the presence of lameness and saddle-fit were recorded. Descriptive statistics, univariable and multivariable mixed-effect linear regression were performed to assess the relationship between horse-saddle-rider factors and changes in back dimensions.

The mean back-shape ratio immediately after ridden exercise was greater compared with before work for all sites. Mean changes in back-shape were greater in horses working correctly versus not working correctly, and in horses with correctly-fitting versus ill-fitting saddles at each site. Mean changes were greater in horses ridden by good > moderately > poorly-skilled riders. Mean changes were less in lame horses compared with sound horses.

Exercise-induced back-dimension changes varied among predetermined sites. In the saddle region the degree and direction of changes are mainly determined by the saddle-fit, whereas outside the saddle region the work-quality is the most influential factor. A uniformly-flocked saddle, fitted with even contact and fitted in balance, was associated with larger dimension changes in the middle third of the saddle region compared with other saddles. The balance of the saddle was the most influential factor for changes in back width in the cranial third of the saddle region. A saddle tipping back or forward has uneven contact, causing focal areas of increased pressure, which may restrict the normal back movement. There were decreased exercise-induced width changes at the shoulder region, T8 and T18 with increased convexity (greater ratio) before exercise. This finding supports previous observations that most dramatic changes occur in young horses with a prominent spine (low ratio [concave shape]) that are worked correctly, and that well-muscled advanced horses also worked correctly exhibit less change after exercise. This is presumably related to a better core strength and muscular support of the thoracolumbar spine in an older advanced horse compared with a young horse.

We recommend that saddle-fit should be checked on a regular basis both before and after exercise. Early recognition of an ill-fitting saddle may provide an opportunity for owners,

trainers and veterinarians to reduce the risk of compromised back movement, development of back pain, muscle atrophy and deterioration in performance because of an ill-fitting saddle.

How much does back shape change over time?

Sue Dyson and Line Greve

Correct saddle-fit is important for optimal function of the equine back. A saddle that does not fit the horse may impair the structural development of the back and cause pain and muscle atrophy. There are a number of factors that may influence back dimension changes over time including skeletal maturation, nutrition, weight-control, season, conformation, duration and type of exercise, base-line muscle development, lameness, back pain and saddle-fit. Better understanding of back dimension changes over time is important for determining how often saddle-fit should be checked.

The aims of the study were to investigate changes in back dimensions over time in sports horses of variable age, from a range of work disciplines, working at different levels. The objectives were to quantify changes in back dimensions over time and determine the influence of horse-saddle-rider data and the association with season, weight, work and saddle-management changes. We hypothesised that 1. changes in back dimensions over time were quantifiable; 2. seasonal variation would occur; and 3. fluctuations in weight, work history and saddle- management would influence the degree and direction of the back dimension changes.

One hundred and four sports horses in normal work were assessed prospectively in a longitudinal study using stratified random sampling within a convenience sampled study population. Thoracolumbar dimensions/symmetry were measured at predetermined sites every second month over a year; weight, work and saddle-management changes were recorded. Statistics were performed to assess the association between management changes, horse-saddle-rider factors and back dimension changes.

Complete data for the entire year was available for 63/104 horses (dressage [n=26], showjumping [n=26], eventing [n=26] and general purposes [n=26]). There were six horses within each work-discipline in three age-groups (3-5 years old; 6-8 and 9-12) and seven horses in one age group (>13). There were considerable variations in back dimensions over one year. In the multivariable analysis the presence of gait abnormalities at the initial examination or asymmetry of back shape were significant; subsequent improved saddle-fit, work intensity, season and bodyweight retained significance.

In accordance with our hypotheses there were quantifiable changes in back dimensions within a two month period and over a year. Seasonal variation did occur and fluctuations in weight, work history, and saddle-management influenced the degree and direction of the back dimension changes. In addition lameness and other gait abnormalities had a significant influence.

The seasonal changes are likely to have been influenced by diet; the majority of the horses were turned out daily with unlimited pasture available in addition to their usual source of nutrition. Muscle development is work-related. Although the quality of work was not assessed, horses in regular work had greater increases in back dimensions than horses in reduced work and horses ridden by expert riders had greater increases than horses ridden by less skilled riders. Horses which are lame often have compromised movement of the back, which is likely to limit muscle development and may result in muscle atrophy. The fit of the saddle was highly influential; improved fit of a saddle allowed the back dimensions to

increase and highlights the importance of saddle fit for development of the thoracolumbar muscles and optimal performance.

In conclusion changes in back dimensions occur throughout the year. Pain elicited by palpation of the back may be an indicator that changes in back dimensions have occurred; saddle-fit should be reassessed. Saddle-fit should ideally be reassessed professionally several times a year, especially if there has been a change in work intensity.

Saddle fit & management: implications for the horse & rider

Sue Dyson & Line Greve

Although sports horses are becoming increasingly valuable, there has been little objective investigation addressing the horse-saddle-rider interaction, particularly the potential consequences of a saddle not fitting the horse, or the saddle not allowing the rider to sit in a position in which they can ride in balance. Poor saddle fit has been associated with back pain in horses, although there are limited studies that have addressed this scientifically. There is evidence that hindlimb lameness may induce saddle slip and rider crookedness. Preliminary results of a series of studies of rider postural control and balance have shown that in addition to natural asymmetries, many riders also suffer from the effects of musculoskeletal trauma, which is an occupational hazard in equestrian sports. Rider asymmetries are perceived to be common, but there are little objective data. There is also little objective information about the relationships between rider health, saddle fit and horse health. The relationship between an ill-fitting saddle, a rider's ability to sit straight and gait abnormalities of the horse remain poorly understood.

The aims of the study were to investigate associations between data about lameness, thoracolumbar asymmetries, saddle fit/movement and rider position obtained from veterinary assessments and provided by riders to identify: 1) key differences in rider perceptions and outcomes from veterinary assessment and 2) possible associations between saddle fit/management and equine back pain/asymmetries. A clinical assessment of horses and riders was performed and data was subsequently obtained from the same riders via an online questionnaire, without the riders being aware of the link between the two initiatives. The horses were selected from a variety of work disciplines, were in regular work and were presumed by their riders or owners to be sound. Asymmetries of the back were assessed and any presence of lameness observed. Saddle slip, fit and management as well as rider straightness were evaluated from both the clinical examination and questionnaire responses.

For the clinical assessment the balance of the saddle was determined by assessing whether the lowest point of the seat of the saddle corresponded to the lowest point of the horse's back. A saddle fitted in balance had the centre of the seat of the saddle horizontal; the lowest part of the saddle and the lowest part of the horse's back were aligned and the panels had even contact with the back along their entire length. The suitability of the width and length of the saddle for the horse's shape was assessed. The clearance of the spinous processes through the gullet, and whether the saddle stayed behind the scapulae during exercise or slid forwards over the caudal aspect of the scapulae at all phases of the step were noted. Unusual movement of the saddle from side to side, lift off the back or slipping forward were recorded.

A total of 205 riders responded to the questionnaire which was divided into six sections: (1) Horse details, (2) Health of the horse, (3) Training and work-related details, (4) Saddle slip, (5) Saddle details and (6) Rider details. Ill-fitting saddles were identified in 43% of horses during the clinical assessment. Saddle slip was observed in 14.6% of horses, which was significantly associated with hindlimb lameness or gait abnormalities. However, only two riders had linked saddle slip and lameness despite strong associations between a history of lameness, history of 'back problems' and history of saddle slip. There was a significantly larger proportion of horses with saddle slip with well-fitting saddles (73.3%) compared with horses with ill-fitting saddles (26.7%). A saddle which bridges may be more fixed in position than a well-fitting saddle.

Thirty-eight per cent of riders reported back pain and in the clinical assessment this was associated with ill-fitting saddles and either a reduced airborne phase of the step in all four limbs or a stiff, stilted canter, suggesting pain. Rider back pain was also associated with rider crookedness. Back pain was improved by riding in 58.1%, exacerbated by riding in 11.3%, and unaffected by riding in 30.6%. It is a common clinical observation that horses with a stiff back cause more jarring of the rider's back and induce rider back pain

Well-fitted saddles were associated with frequent (at least once a year) professionally assessed saddle fit check. Hard flocking and the presence of lumps and depressions in the flocking were more common in saddles whose fit was checked less than once yearly compared with those checked at least yearly. Saddles whose fit was not assessed at least yearly were associated with a saddle tipping back on the horse's back, using an additional pad beneath the saddle and having asymmetries in back shape. Horses with saddles tipping forward were more likely to be ridden in saddles used for ≥ two horses.

Horses ridden by expert riders were less likely to have asymmetry of the back compared with those ridden by non-expert riders.

The results strongly suggest that saddle fit should be checked regularly by appropriate professionals and that riders and trainers should be encouraged to learn how to identify ill-fitting saddles. Worryingly, 30% of horses that had their saddles professionally checked at least once yearly still had an ill-fitting saddle. What is unknown is whether these saddles had ever fitted correctly or whether a properly qualified saddle fitter was responsible for the fitting. It can only be of benefit for riders, trainers, veterinarians and other associated professionals to become more educated about the complexity of the links between lameness, saddle slip, ill-fitting saddles and rider crookedness.

Further reading:

Greve, L., Dyson, S. 2013. Fitting, using and maintaining your saddle.

http://www.aht.org.uk/skins/Default/pdfs/saddle_guide.pdf