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Disorders of the thoracolumbar spine of the horse — a survey of 443 cases

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Summary

The survey comprised 443 horses, referred to the clinical department of the Equine Research Station, with a history of a thoracolumbar (TL) complaint. A wide range of lesions were capable of producing back problems and more than one condition or site of injury was found in 75 animals (17 per cent). There were 103 horses (19.7 per cent) with no evidence of damage to the TL spine or its associated structures. In 66 of these cases, clinical signs were attributed to a variety of hindlimb lamenesses and, in 37, no specific diagnosis could be made.

Soft tissue injury was diagnosed in 203 cases (38.8 per cent), the most frequent sites being the longissimus dorsi muscles and/or the supraspinous ligament in the caudal withers and cranial lumbar regions. Chronic sacroiliac strain or mild sacroiliac instability was also a frequent cause of low back trouble in competitive horses. Other conditions included tying-up, subluxation of a lumbar vertebra and neuritis of the cauda equina.

Fifteen cases (2.9 per cent) of vertebral malformations were found including scoliosis, lordosis and kyphosis. Vertebral lesions accounted for 202 (38.6 per cent) of the diagnoses. The most common condition was associated with crowding and overriding of the dorsal spinous processes in the caudal thoracic and cranial lumbar regions. This was most often diagnosed in competitive jumping horses (173 cases) and caused a loss of suppleness and spinal flexibility resulting in lowered performance and bouts of back pain. There was a comparatively low incidence of fractures (13 cases) and degenerative spondylosis (14 cases).

Introduction

THE literature on thoracolumbar (TL) disorders has recently been reviewed (Jeffcott 1979a). Previous papers have described a method for the clinical examination of horses with a potential back problem (Jeffcott 1975 and 1979b), the technique for routine radiography (Jeffcott 1979c) and the normal radiographic anatomy of the equine TL spine (Jeffcott 1979d). This paper reports on the data analysis of 443 horses with suspected TL injury referred, for clinical and radiological investigation, to the clinical department of the Equine Research Station (ERS) between 1972 and 1977 inclusive.

Case material

The details of age, sex, type, use and body weight (bwt) of the 443 horses included in the survey are shown in Fig 1. In each case, a full case history was obtained from the owner

or trainer and the attending veterinarian and a physical examination at rest and during exercise was performed. Serum enzymes, including aminoaspartate transferase (AST) and creatinine kinase (CK) were measured. The TL spine was subjected to radiography in the standing position for the withers and back (ie, from T₂ to L₃) and in dorsal recumbency under general anaesthesia for the spine caudal to the fourth lumbar vertebra, to enable the dorsoventral plane to be radiographed.

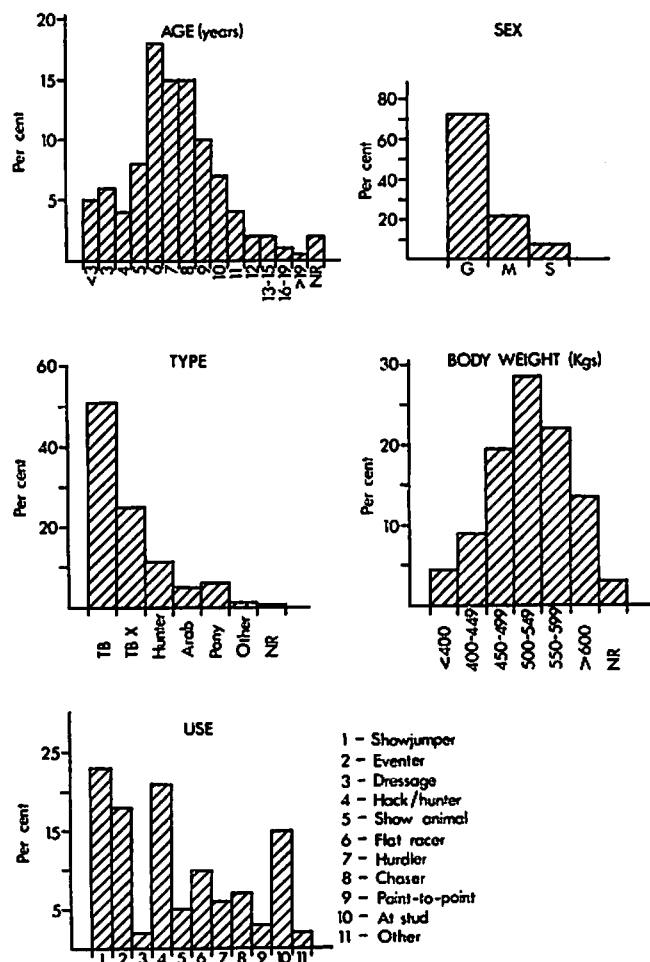


Fig 1. Combined data on age, sex, type, body weight and use of 443 horses referred with a suspected back complaint

TABLE 1: Analysis of the diagnoses made in 443 horses referred with a suspected back injury

Category	No	%	Specific diagnosis	No	%
Soft tissue injuries	203	38.8	Muscular damage/ligamentous strain	117	22.37
			Tying-up (setfast, myositis)	7	1.34
			Sacroiliac strain	69	13.19
			Displaced lumbar vertebra	1	0.19
			Neuritis of the cauda equina	3	0.57
			Sublumbar or spinal abscess	2	0.38
			Surgical complications	4	0.76
Thoraco-lumbar lesion	15	2.9	Scoliosis	1	0.19
			Lordosis	7	1.34
			Other	7	1.34
Vertebral lesions	202	38.6	Fractures of vertebral bodies	5	0.96
			Fractures of dorsal spinous processes	8	1.53
			Ossifying spondylosis	14	2.68
			Overriding dorsal spinous processes	173	33.08
			Other bony degeneration	2	0.38
Miscellaneous conditions	66	12.6	Stifle and hock lameness	20	3.82
			Lower limb lameness	11	2.10
			Temperamental involvement	24	4.59
			Dental and other miscellaneous conditions	11	2.10
No diagnosis made	37	7.1	No diagnosis made	37	7.07
Total	523	100			

Results

The diagnoses (Table 1) made in the survey were categorised as follows.

- (1) Soft tissue injuries.
- (2) Conformational defects.
- (3) Vertebral lesions.
- (4) Miscellaneous conditions.
- (5) Undiagnosed.

Two conditions were diagnosed in 70 cases and 5 horses showed evidence of 3 different lesions (Table 2). There were, therefore, a greater number (80) of specific diagnoses than animals referred for investigation.

SOFT TISSUE INJURIES

There were 203 cases diagnosed as soft tissue injuries (Table 1).

MUSCLE STRAIN

Muscular injury, principally involving the longissimus dorsi complex, usually occurred during ridden exercise, a slip, fall or poorly executed jump causing uni- or bilateral strain. All types and ages of horses were affected and the damage was at a fairly advanced stage by the time of referral.

Clinical signs

Consistent findings were acute onset, poor performance and a change in temperament. The back was kept rigid and the hindlimb gait noticeably restricted. There was marked reduction in the flexibility of the TL spine and, in some cases, lateral curvature was observed due to increased muscle tone or spasm of one or other longissimus dorsi muscle (ie, spastic scoliosis). Initially, some slight swelling with heat might be detected and in the acute stage some increase in the

TABLE 2: Details of the multiple diagnoses made on 75 horses referred with a back problem

Category	Additional conditions found						
	Muscular/ ligamentous injury	Sacroiliac strain	Fractures	Overriding dorsal spinous processes	Hind limb or lower limb lameness	Temperament involvement	Other conditions
Muscular/ligamentous injury	—	10	2	18	2	2	0
Conformational defects	4	0	0	1	2	0	0
Sacroiliac strain	—	—	1	18	2	2	0
Fractures	—	—	—	1	0	0	0
Spondylosis	—	—	—	2	0	1	0
Overriding dorsal spinous processes	—	—	—	—	1	6	1
Hindlimb or lower limb lameness	—	—	—	—	—	3	0
Temperamental involvement	—	—	—	—	—	—	1

blood levels of the muscle enzymes after exercise occurred, although changes were small and transient (ie, 2 or 3 fold increase in resting levels).

EXERTIONAL MYOPATHY (TYING-UP)

There were no horses referred which exhibited the classic clinical picture of azoturia but 7 animals suffered from the less severe and somewhat atypical form of tying-up. All were in good or excellent bodily condition and showed stiffness and evidence of pain in their backs with restriction of the hindlimb gait after varying amounts of exercise. The intensity of the clinical signs was usually related to the workload. The signs were frequently recurrent and the diagnosis was confirmed from the history, clinical signs, the negative results on radiography and elevated serum muscle enzymes after exercise.

LIGAMENTOUS DAMAGE

The supraspinous ligament was a common site of injury occurring most often in younger subjects with long, flexible TL spines. This structure runs down the middle of the back and is firmly attached to the summits of the thoracic and lumbar dorsal spinous processes. It includes the multiple tendon insertions from various parts of the longissimus dorsi and is, therefore, subject to strain in the same way as the muscles. Some degree of muscle strain was, therefore, probably also involved. Strain probably constituted the "rick" or

"chink in the chine" referred to in the old veterinary textbooks (Lupton 1876).

Clinical signs

Clinical signs were essentially similar to muscle strain but usually persisted for longer and the prognosis was less favourable. The cranial lumbar region was the most common site of injury and usually some thickening occurred in the midline over one or more summits. Lateral flexibility, in one or both directions, of the TL spine was reduced. Pain on palpation was a common sign even in the more longstanding cases. Radiological examination usually revealed the soft tissue thickening and, occasionally, a focal increase of radiodensity in the ligament. Detached flakes from the spinous summits were readily demonstrated and slight periosteal roughening on the dorsal surfaces was common. In one case a biopsy taken from the ligament showed diffuse mild degenerative change and fibrosis on histological examination.

The case of a 2-year-old Thoroughbred colt is cited as an example. This horse had damaged its back coming out of the starting gate too rapidly and had torn the insertion of the supraspinous ligament from the top of the dorsal spines in the caudal withers. A painful swollen area was found in the mid-thoracic region and a flake of bone had become detached from the summit of T₆. The colt's performance was severely affected and its hindlimb action became very restricted. After 6



TB gelding with SIS

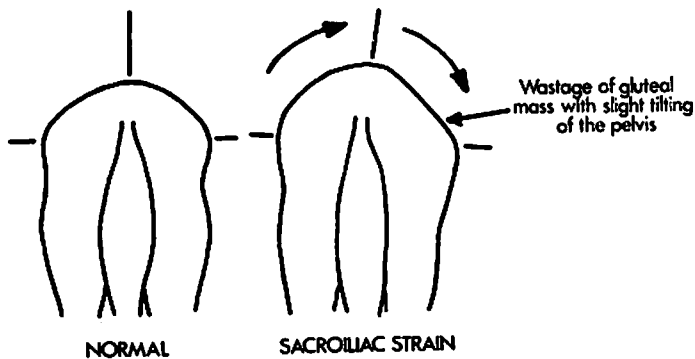
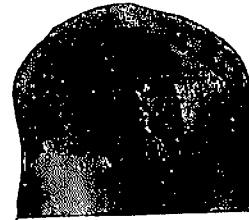
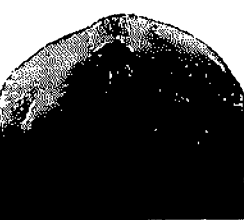
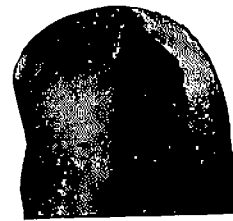
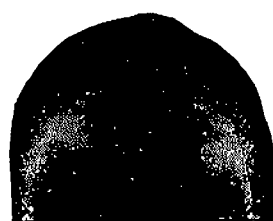
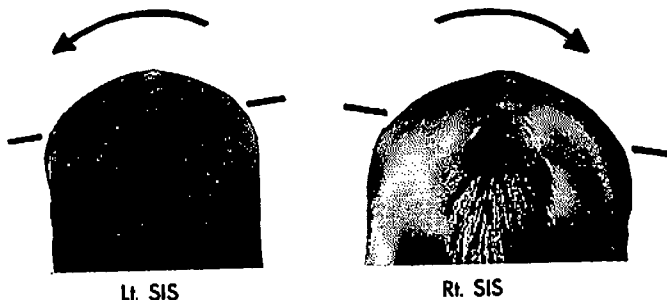


Fig 2. Sacroiliac strain (SIS). This figure illustrates a common type of conformation for this condition; a diagrammatic representation of a normal and asymmetric pelvis and the caudal views of 6 horses with differing causes of asymmetry of the quarters

months rest it improved markedly; the flake of bone was just discernible radiographically but no local periosteal reaction was evident.

In general, the prognosis for strain or injury to the supraspinous ligament was considered guarded, largely because of the likelihood of recurrence. A number of horses recovered but subsequently developed signs of "cold back", which did not affect their performance.

CHRONIC SACROILIAC STRAIN

These cases usually presented with a history of severe pain in the pelvic or sacroiliac region associated with marked hindlimb lameness. The subacute and chronic strain were often presented as a back problem and the condition was particularly prevalent in large animals (162.6 to 172.7 cm) with long backs and weak-looking quarters (Fig 2). A fall or

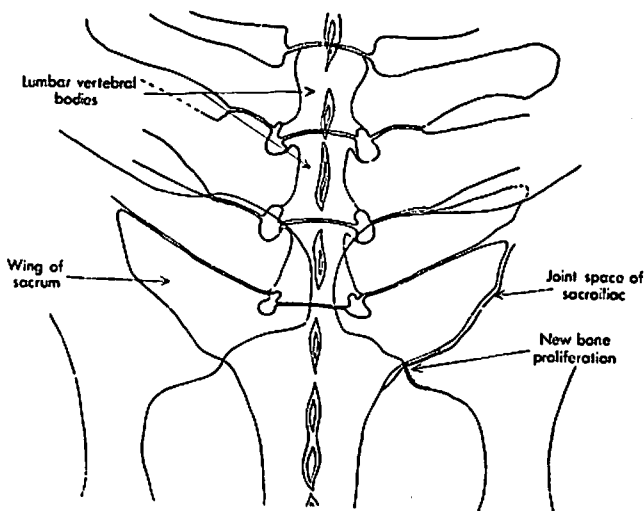
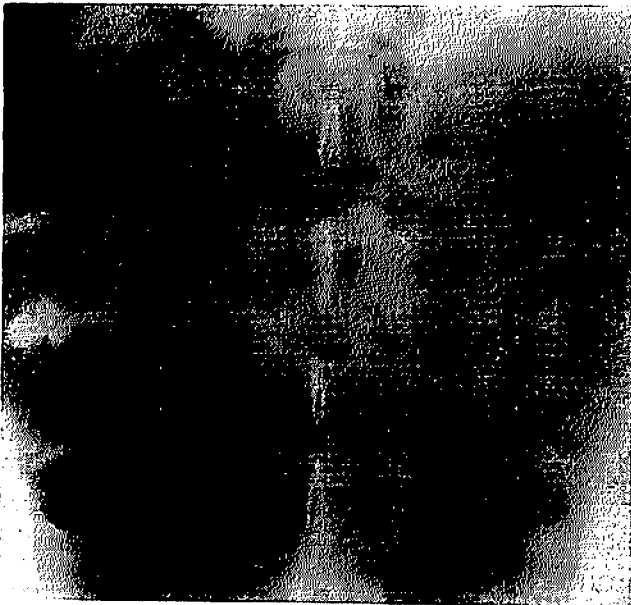


Fig 3. Sacroiliac strain in an 8-year-old Thoroughbred gelding with evidence of osteoarthritis (arrowed) at the caudal aspect of the joint

similar incident was often reported although signs were not always recognised for some time afterwards. The animal's performance was affected, particularly at slower paces or during dressage. An intermittent, sometimes shifting, hindlimb lameness associated with stiffness and rigidity of the spine in one direction was reported.

Clinical signs

The tail was sometimes held across the midline usually to the affected side. Most cases showed some degree of asymmetry of the hindquarters due to a malalignment or apparent tilting of the pelvis in addition to some muscle wastage on one quarter (Fig 2).

In the acute stages pain could be evinced by applying pressure to the midline just in front of the tuber sacrale, by pressing down over the tuber coxae or by flexing the affected leg. Once the condition was chronic, no pain in the lumbosacral region could be elicited and hyperflexion of the hindlimbs was not resented. However, there was often a reduction in flexibility of the TL spine with resentment or reluctance to dorsiflex (ie, dip the back).

At exercise there was often some stiffness in the back with dragging of one or both toes and a tendency to "plait" (ie, the foot of the affected limb swings inward in the anterior phase of the stride and is placed almost in front of the opposite hindfoot).

Few cases showed obvious hindlimb lameness, but dropping of the affected quarter was sometimes noted. A flexion (spavin) test rarely produced any effect on hindlimb action. When ridden, cases showed evidence of stiffness of the hindlimb action with an apparent lack of impulsion from the quarters. In many longstanding cases, jumping was not seriously impaired and continued exercise did not seem to exacerbate the clinical signs. Many of these animals responded temporarily to administration of therapeutic doses of an anti-inflammatory drug, such as phenylbutazone.

There were few radiographic features detectable apart from evidence of increased joint space of the sacroiliac articulation and slight rotation of the pelvis or sacrum. In one case showing right hindlimb lameness there were signs of some early osteoarthritic change at the caudal edge of the joint (Fig 3).

Post mortem material

Only 2 cases became available for post mortem examination but both showed similar findings; there was no obvious stretching of the sacroiliac ligaments but noticeable new bone proliferation was present at the caudal aspect of the sacral wing (Fig 4). This large spur of new bone was covered in cartilage and articulated with a similar, but smaller, spur on the opposing auricular surface of the ilium. The sacrolumbar articulation, hip joints and remainder of the caudal vertebral column showed no remarkable pathological abnormality.

UNCLASSIFIED CONDITIONS

One case showed evidence of vertebral displacement or subluxation unaccompanied by vertebral fracture or deformity. This was a 13-year-old Thoroughbred broodmare exhibiting signs similar to sacroiliac strain. Some lateral displacement of the fifth lumbar vertebra was demonstrated radiographically (Fig 5) and the mare showed gradual improvement during the 6 months following referral with no treatment being administered.



Fig 4. The left wing of the sacrum from an 8-year-old Thoroughbred gelding diagnosed as having the condition of chronic sacroiliac strain. There is a large spur (arrowed) of new bone covered in articular cartilage on the caudal aspect of the sacral wing

Two cases of neuritis of the cauda equina were presented and showed progressive perineal paralysis and wastage of the quarters with negative radiographical results. The perineum was desensitised and there was atrophy of the gluteal muscles. At post mortem examination the spinal cord and nerve roots were found to be thickened, haemorrhagic and oedematous. Histologically there was severe inflammation with demyelination, degeneration and cellular infiltration, followed by proliferation of the perineurium and local fibrosis. A third case was suspected but not confirmed in a 5-year-old Thoroughbred with a history of making a bad jump in a hurdle race followed by a sudden onset of perineal paralysis which improved over the next month only to recur after a bout of colic. No radiological evidence of damage to the sacrum was found, the paralysis again disappeared and the animal made an apparently complete recovery.

CONFORMATIONAL DEFECTS

The 15 cases referred with conformational defects showed evidence of scoliosis, lordosis or kyphosis (Fig 6) and the details of the clinical findings are summarised in Table 3.

Scoliosis

Scoliosis (lateral curvature of the spine) was not always obvious visually as is illustrated in the case of a Thoroughbred foal in which the diagnosis was made on an S-shaped bend of the caudal thoracic vertebral column seen on a ventrodorsal radiograph (Fig 7). This colt showed a rather stilted hindlimb action with inflexibility of the back at exercise in the paddock. A congenital cystic condition of the maxilla was also found and the foal was destroyed at age 6 months because its prospects as a racehorse were severely limited.

Another case showing only a mild degree of scoliosis was an 8-month-old Arab colt with synostosis (congenital fusion of the vertebral bodies) of 2 lumbar vertebrae (L₂ and L₃). These abnormalities were accompanied by changes in the neural arch and spinal processes (Fig 8). The colt showed a poor straddling hindlimb gait with obvious inflexibility of the back. A reduction in general manoeuvrability was observed and the colt had difficulty in rising from the recumbent position. The degree of scoliosis and of the lumbar spine kyphosis was considered to be secondary to the synostosis.

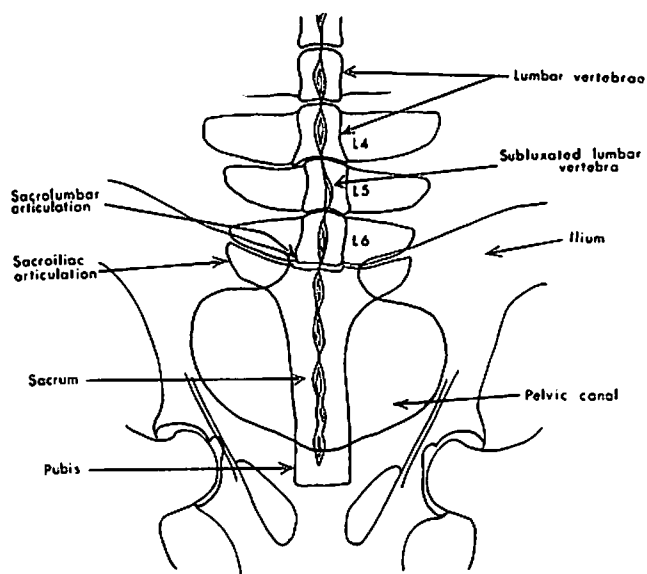
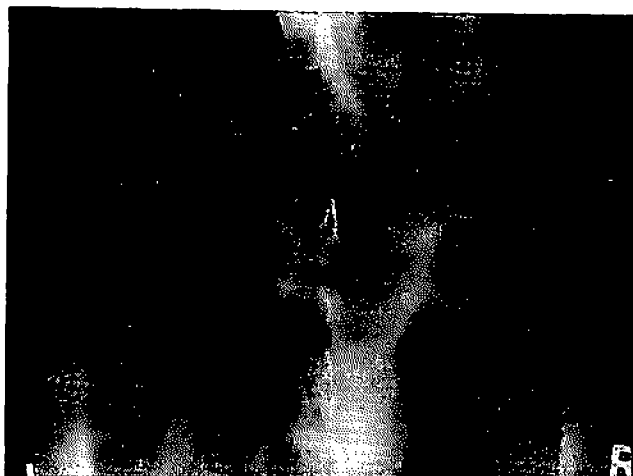


Fig 5. Ventrodorsal radiograph and explanatory diagram of a 13-year-old Thoroughbred mare with apparent subluxation of L₂.

Lordosis

Severe lordosis (ventral curvature of the spine—dipped or sway-back) of the mid-thoracic region was observed in a 6-month-old Thoroughbred filly with a clinical picture similar to that described for scoliosis. The central curvature in the mid-back was so marked that obliteration of the interspinous spaces between the dorsal spines had occurred and secondary overriding lesions were already present. The animal was destroyed and post mortem examination confirmed the changes seen radiographically.

Six adult horses had demonstrable lordosis of the mid- to caudal thoracic region. It was not usually clear whether these deformities were congenital or acquired but they were much less marked than that seen in the foal described above. They were generally associated with bouts of soft tissue damage to the back or overall poor performance at ridden and jumping exercise. In most the radiological changes were slight, but in the more severe types some crowding and overriding of the dorsal spines occurred. The ventral curvature of the TL spine seemed to predispose these animals to back trouble,

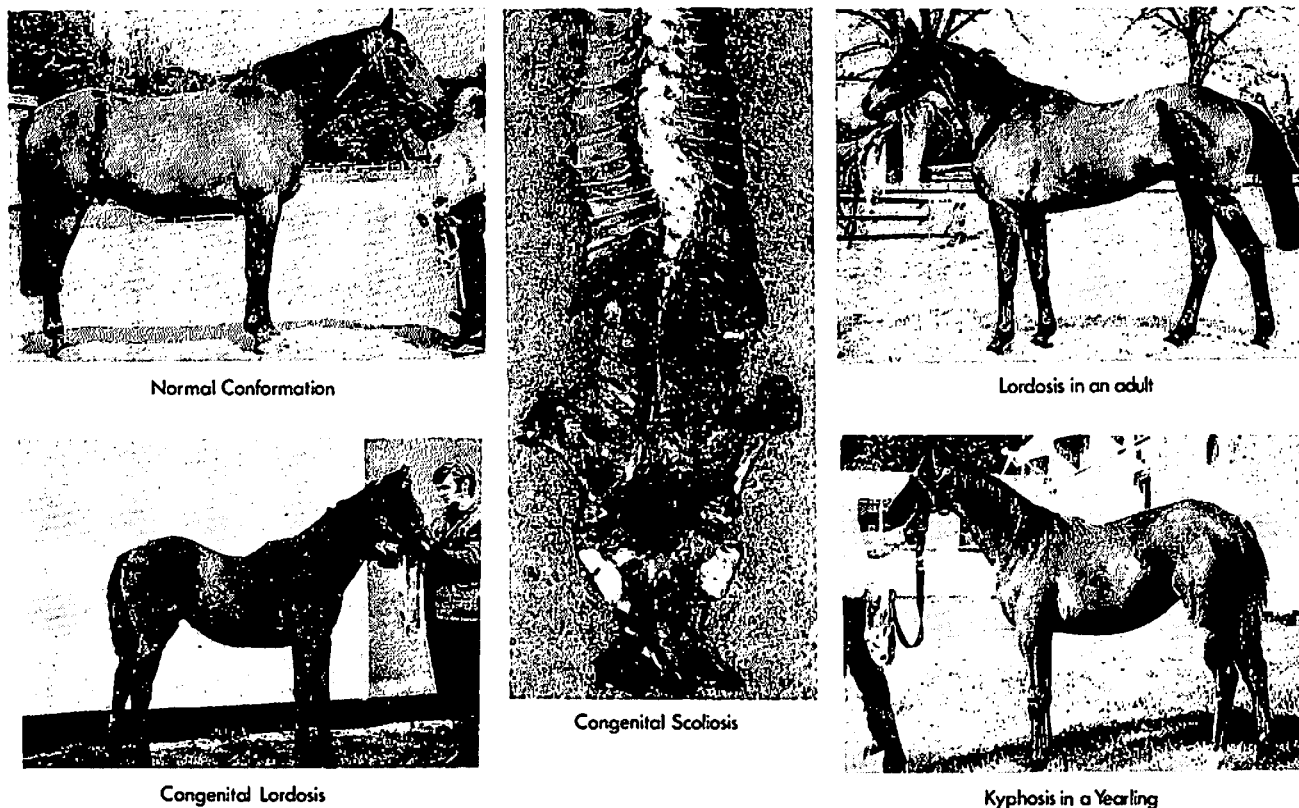


Fig 6. Examples of conformational defects of the thoracolumbar spine

presumably by the extra stress put on the epaxial structures of the vertebral column.

Kyphosis

Kyphosis (dorsal curvature of the spine—roach back) was most frequently seen in young animals exhibiting varying degrees of bilateral stifle damage (eg, epiphysitis or osteochondrosis dissecans). Improvement only occurred if the underlying cause was resolved.

VERTEBRAL LESIONS

Two hundred and two cases of vertebral lesions were found (Table 1).

VERTEBRAL FRACTURE

The clinical details of 13 cases of fracture of the vertebral column (from T₁ to Cy₁) are shown in Table 4.

Fractures of the thoracic dorsal spinous processes were readily diagnosed as there was often a history of a traumatic incident with local pain, heat and swelling. Multiple fractures of the spinous summits in the withers resulted from horses rearing and falling over backwards. The tips of the summits were fractured and displaced laterally but once the pain and local reaction had subsided a satisfactory recovery ensued. A residual depression on the withers frequently remained but there was no permanent effect on the animal's performance, although in 3 cases the deformity of the withers required a special saddle to be made. In 2 cases there was an incomplete fracture of an individual spinous process. They both had back

pain and the diagnosis was confirmed by radiography. After a period of rest they made an uneventful recovery.

DEGENERATIVE (OSSIFYING) SPONDYLOSIS

Radiological evidence of spondylosis was usually associated with serious clinical consequences and in only 3 cases was it detected as an incidental finding; in a 5-year-old mare with suspected tuberculosis of the cervical spine, a 7-year-old mare with Maries disease (hypertrophic pulmonary osteoarthropathy) and a 16-year-old mare with chronic forelimb lameness.

Spondylosis was seen in the more mature animals (6 to 20 years) and there was a much higher proportion (64 per cent) of mares affected than in other TL disorders (Table 5). In some of the cases there was a history of a serious fall, but in others the early signs of back pain were diagnosed as exertional myopathy (tying-up).

Clinical signs

Palpation of the spine was strongly resented and there was reduced spinal flexibility. Ventroflexion and dorsiflexion of the back sometimes produced a violent reaction with kicking and efforts to prevent any palpation or manipulation being repeated. There was usually no difficulty taking the weight of a rider, but transient resentment to tightening the girth and on mounting were sometimes noticed. At exercise marked rigidity of the spine was a feature which was associated with poor performance at fast paces and during jumping. The clinical signs often remained static for long periods and in one case, an 8-year-old mare, no significant improvement occurred for 4 years.

TABLE 3: Clinical details of 15 cases showing defects of conformation

No	Type	Use	Sex	Age (years)	Remarks
1	TB	At stud	S	6m	Congenital scoliosis of caudal thoracic spine ; colt was destroyed
2	Arab	At stud	S	8m	Congenital synostosis (L ₂ -L ₃) with associated scoliosis and kyphosis of lumbar spine
3	TB	At stud	M	6m	Congenital lordosis of mid and caudal thoracic spine associated with overriding dorsal spinous processes ; filly was destroyed
4	TB	Hurdler	G	5	Lordosis of mid thoracic spine with associated kyphosis ; showed poor performance at speed and over jumps
5	TB	Hurdler	G	6	Lordosis of mid thoracic spine associated with overriding dorsal spinous processes ; gelding showed periodic back trouble
6	TB	Chaser	G	6	Mild lordosis associated with intermittent poor performance
7	Hunter	Showjumper	G	11	Mild lordosis associated with damage to the supraspinous ligament of the mid back
8	TB	Hurdler	M	5	Mild lordosis associated with soft tissue damage to the back
9	TBX (¾ bred)	Eventer	G	11	Mild lordosis associated with soft tissue damage to the back
10	TB	Flatracer	S	2	Kyphosis noted without obvious clinical signs
11	TB	At stud	S	1	Kyphosis noted without obvious clinical signs ; improved without treatment
12	Anglo Arab	At stud	S	1	Kyphosis associated with severe osteochondrosis dissecans of both stifles ; colt was destroyed
13	TB	Flatracer	G	3	Kyphosis associated with soft tissue damage to the stifle
14	TB	Hack	G	4	Poor performance possibly associated with animal's general poor conformation
15	TB	Eventer	M	6	Poor conformation of back and quarters resulting in strain of the supraspinous ligament

TB—Thoroughbred ; TBX—part-bred ;
S—colt or stallion ; M—filly or mare ; G—gelding.

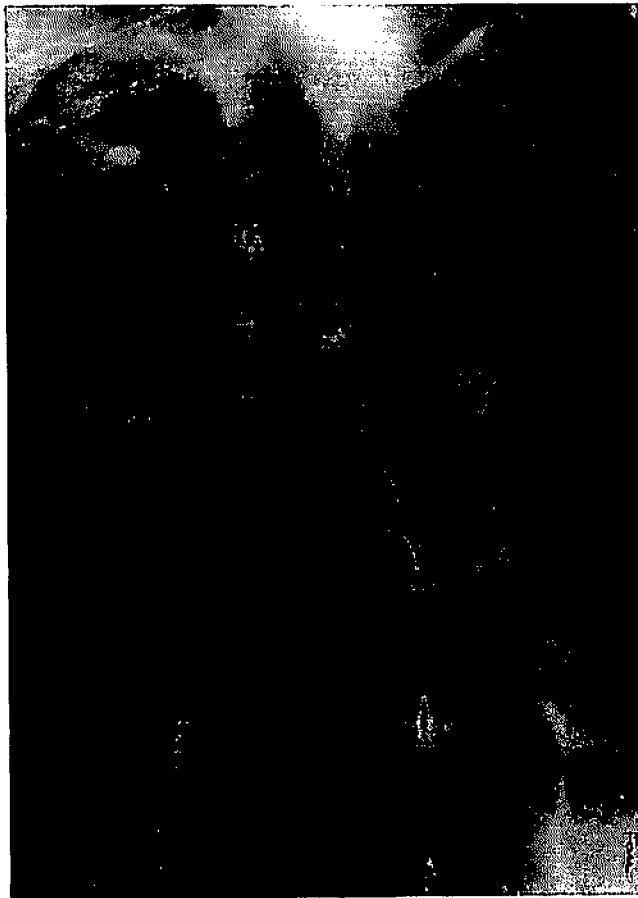


Fig 7. Ventrodorsal radiograph of thoracolumbar spine of a 6-month-old Thoroughbred colt with congenital scoliosis

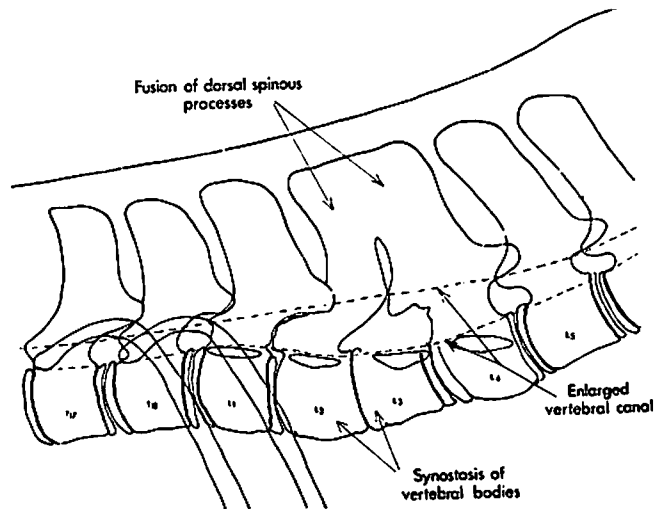
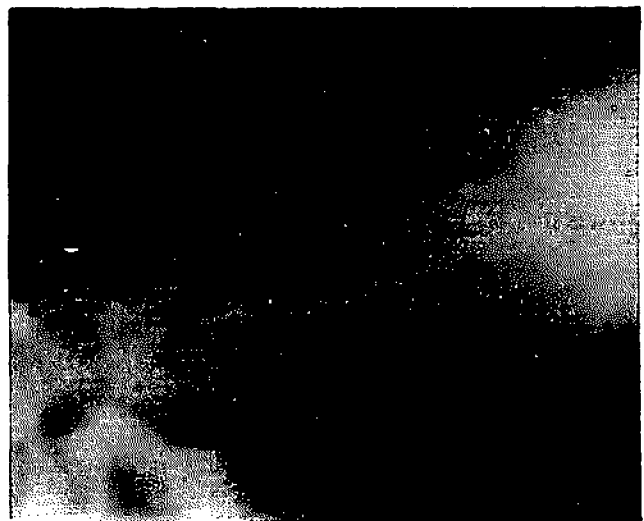


Fig 8. Lateral radiograph and explanatory diagram of the same foal with synostosis

TABLE 4: Clinical details of 13 cases of fracture of the vertebral column

No	Type	Use	Sex	Age (years)	Site	Remarks
Dorsal spinous processes						
1	TB/Connemara	Hack/hunting	G	7	T ₁	History of stiff neck and difficulty turning and jumping; satisfactory clinical improvement
2	Pony	Showjumping	G	7	T ₃ -T ₆	History of poor jumping performance and lameness; no recent history of accident
3	TBX (¾ bred)	Hack	M	4	T ₂ -T ₈	Reared and fell over backwards going into horse box; satisfactory clinical improvement
4	Anglo-Arab	Show hack	M	7	T ₂ -T ₉	Accident coming out of horse box, fell onto its back; satisfactory clinical improvement
5	TB	Steeplechasing	G	3	T ₃ -T ₁₃	Broke loose from lunge rein, reared up and fell on withers; satisfactory clinical improvement
6	TB	Steeplechasing	G	10	T ₄ -T ₈	Chronic fractures of withers; also had sacroiliac strain and some overriding dorsal spinous processes
7	TB	Flat racing	S	2	T ₆	Difficulty breaking in; tended to rein back and rear up; satisfactory clinical improvement
8	TB/pony	Showjumping	G	6	T ₇	Presented with back pain and poor jumping performance; satisfactory clinical improvement
Vertebral bodies						
1	TB	At stud	M	1½	T ₁₃ -T ₁₃	Accident in paddock, became paraplegic immediately; was destroyed
2	TB	Flat racing	M	3	T ₁₆	Sudden onset of back pain and ataxia; rested 6 months and improved satisfactorily
3	TB	Point-to-pointing	G	8	L ₁	Pulled up after bad jump, in pain initially severely ataxic; was destroyed
4	TBX	Hunting	M	8	L ₂ -L ₃	Bad jump out hunting, walked 2 miles home then became paraplegic; was destroyed
5	TB	Show hunter	G	7	Cy ₁	Reared up and went over backwards, damaged base of tail; satisfactory clinical improvement

TB—Thoroughbred; TBX—part-bred; S—colt or stallion; M—filly or mare; G—gelding

Tube agglutination and Coomb's microglobulin tests showed that there was no relation in these 14 cases of spondylitis to *Brucella abortus* infection.

Radiological changes

Radiographically the lesions varied in site and extent but were concentrated at the mid-point of the back (Fig 9a). There were flange or spur-like osteophytes arising from the ventral and ventrolateral borders of the vertebral bodies (Fig 9b). At some sites the osteophytes fused to form a bridge

of new bone across the intercentral joint space but at others the spurs did not fuse even after prolonged periods. They did not usually change in character or size for many months or years and clinical signs did not appear to improve until complete fusion had taken place.

The presence of a generalised osteoarthritis of the spine was seen only once in an aged pony mare which had been retired from active work for some years before it was destroyed. In this case there was also new bone desposition around the thoracic and lumbar intervertebral foramina with resultant narrowing of the lumen at some sites. These findings were not

TABLE 5: Clinical details of 14 cases of ossifying spondylosis

No	Type	Use	Sex	Age (years)	Site(s) involved
1	TBX	Hack/hunting	Mare	9	T ₉ -T ₁₄
2	TBX	Showjumping	Mare	9	T ₁₀ -T ₁₃
3	Anglo-Arab	Hack/jumping	Mare	9	T ₁₁ -T ₁₂
4	Pony	Hack	Mare	20	T ₁₁ -T ₁₂
5	TB	Hunting	Mare	6	T ₁₁ -T ₁₂
6	TB	Eventing	Mare	8	T ₁₁ -T ₁₅
7	TBX	Showjumping	Mare	7	T ₁₁ -T ₁₂
8	Pony	Hack	Geld	10	T ₁₁ -T ₁₃ ;
9	Pony	Hack	Mare	7	T ₁₅ -T ₁₀ ; L ₁ -L ₂
10	TBX	Eventing	Geld	11	T ₁₂
11	Anglo-Arab	Showing	Geld	8	T ₁₂
12	TBX	Showjumping	Geld	7	T ₁₂ -T ₁₃
13	TBX	Eventing	Geld	10	T ₁₂ -T ₁₃
14	Hunter-type	Hunting	Mare	8	T ₁₂ -T ₁₃

TB—Thoroughbred; TBX—part-bred.



Fig 9a. The distribution of lesions in the thoracolumbar spine of 14 horses with ossifying spondylitis



Fig 9b. Post mortem specimen of ossifying spondylitis in an aged pony gelding

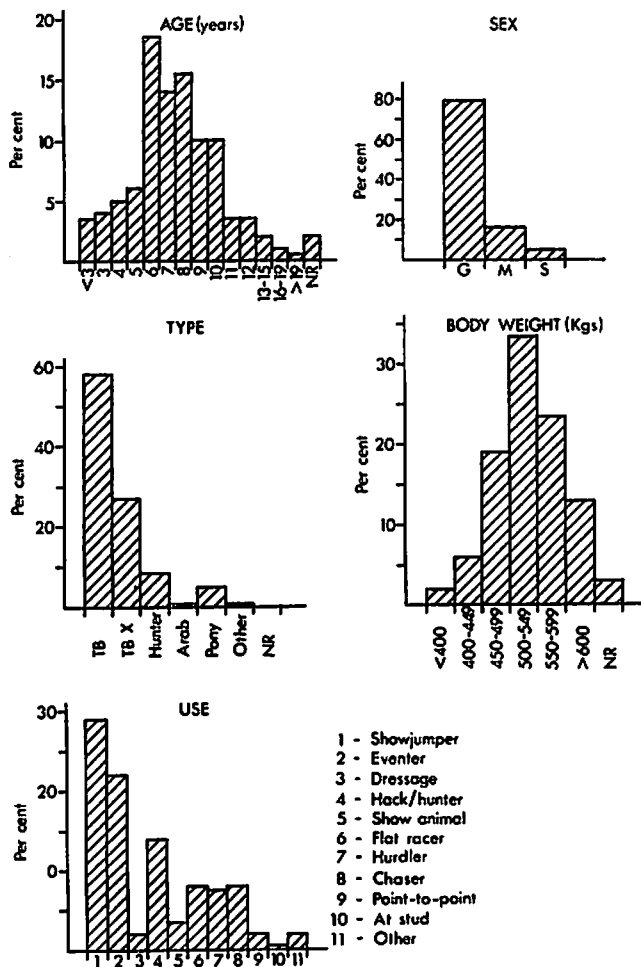


Fig 10. Breakdown of 173 horses diagnosed as having overriding of the dorsal spinous processes in the thoracolumbar spine

associated with demonstrable clinical signs. Mitchell (1933) described similar changes at the lumbosacral intervertebral foramina which he thought caused pressure on the sciatic nerves and led to the condition of shivering. However, these osteophytic lesions can be found in apparently normal horses without evidence of back pain or shivering.

CROWDING AND OVERRIDING OF THE DORSAL SPINOUS PROCESSES

The distribution of age, type, use, sex and bwt of horses suffering from crowding and overriding of spinous summits in mid or caudal TL spine is shown in Fig 10. The impingement of the dorsal spinous processes, chiefly beneath the saddle area, T₁₂ to T₁₇, appeared to predispose horses to back pain. They usually presented with a chronic history frequently having received empirical treatment for back trouble. The condition was prevalent in young adult horses of middle to heavy bwt used for jumping or dressage and in Thoroughbred or partbred animals with short backs.

Clinical signs

The onset of signs was often insidious, although a history of trauma to the back from a fall was sometimes reported. Many horses were referred for loss of performance associated with increasing stiffness in the back and an abnormality of the hindlimb gait. One of the first signs noted by owners was a change in the animal's temperament or resentment to grooming, saddling or rugging-up. There was sometimes reluctance

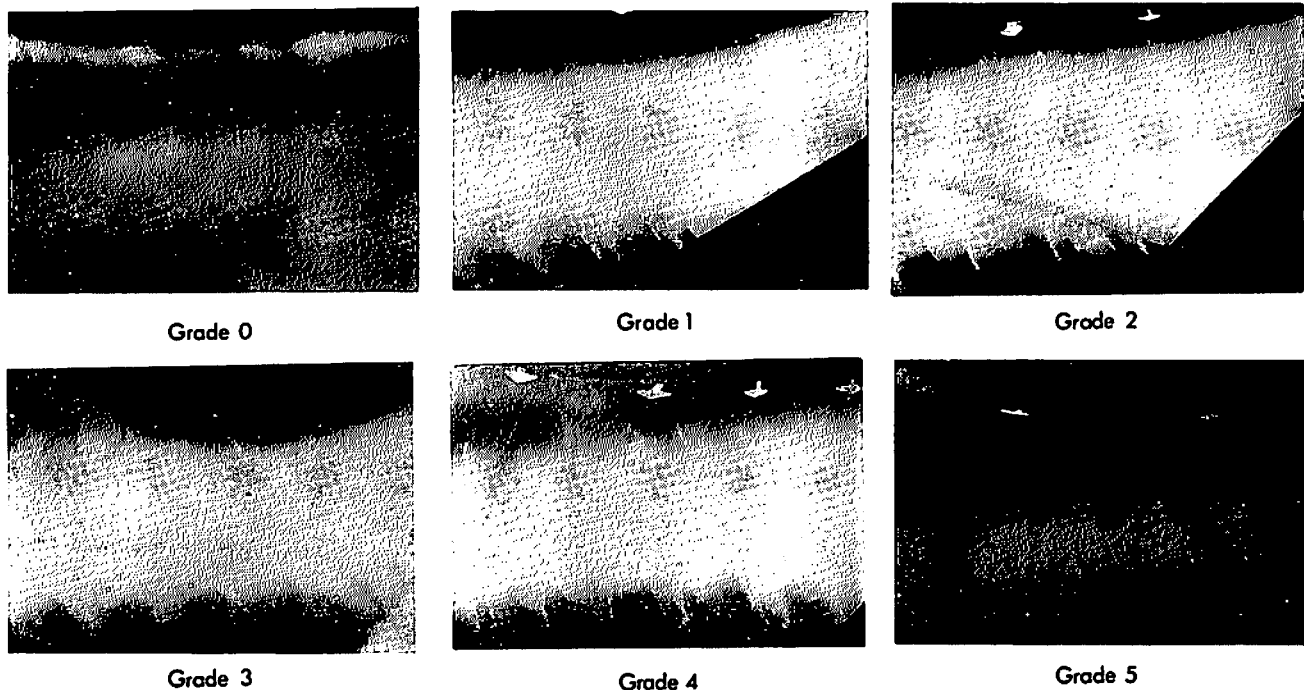


Fig 11a. The system of grading the radiographic changes seen in the condition of overriding of the dorsal spinous processes. Examples of 6 horses with grades from 0 to 5

to lie down or roll or to move over in the box. Some were disinclined to have their hind feet picked up for cleaning or shoeing.

In some animals a degree of hindlimb lameness was reported but it was frequently difficult to identify with certainty the site or even the limb involved. At exercise affected horses did not always track up well with their hindlimbs and tended to go on 2 tracks behind. Signs of toe-dragging and plaiting of the hind feet were not usually seen but poor jumping performance was nearly always a feature, particularly at the combination-type fences. Overt signs of back pain were not always exhibited although on manipulation there was invariably resentment to dorsiflexion with noticeable rigidity of the TL spine. In severe and chronic cases a degree of wastage of the longissimus dorsi muscles was sometimes apparent. There were 18 cases in which back pain was associated with some secondary muscular or ligamentous damage and another 18 showed signs of sacroiliac strain as well as overriding of the dorsal spinous processes.

Radiological changes

Pressure points between opposing spines with local periosteal reaction, small bony cysts and false joint formation were found radiographically. The tips of the summits sometimes overlapped one another and often became misshapen because of friction. The severity of the lesions varied considerably and in many the clinical signs exhibited were not directly related to the amount of damage seen radiographically. Radiological changes of this type were also seen in some horses with apparently normal backs (Jeffcott 1979d). However, the incidence was lower and the lesions were generally less severe.

In order to quantify the radiological findings a system of grading the changes was introduced (Fig 11a and b). A

comparison was made of the "overriding" cases with the "normal" group, the cases of hindlimb lameness and the other causes of back trouble (Fig 12). The region of the vertebral column principally affected was the caudal thoracic region, T₁₂ to T₁₇, (Fig 13). The formation of false joints (pseudoarthrosis) between opposing spines was very common but fusion of the summits occurred in only one case, at T₁₄ to T₁₅ in a pony.

Possible pathogenesis of the condition

The source of pain in these cases of overriding dorsal spinous processes was often not clearly understood. Local anaesthesia of the interspinous spaces resulted in marked improvement of the performance in some horses and eliminated the back pain, whereas this technique did not appear to improve horses with ligamentous or muscular injuries. There was presumably some discomfort at exercise produced by the impingement of the spinous processes associated with the local periosteal reaction and the secondary pseudoarthrosis (Von Salis and Huskamp 1978) (or bursitis). Repeated maximal dorsiflexion of the spine during fast exercise or jumping might well have activated or exacerbated some of the chronic lesions. However, as in man (Wyke 1976), considerable differences in the threshold of back pain could be expected, with some animals apparently being able to perform satisfactorily in spite of the condition. A comparable condition to overriding has been described in man (Hazlett 1964) from which the pain is said to derive from a lumbar spine bursitis.

The predilection site of the condition is the mid-back where the weight of the rider is exerted and the interspinous spaces are narrowest. This may explain why the condition was much more common in Thoroughbreds than in other breeds, which tended to have wider interspinous spaces (Jeffcott 1979d). It would appear, therefore, that the underlying cause of the condition involves the conformation of the

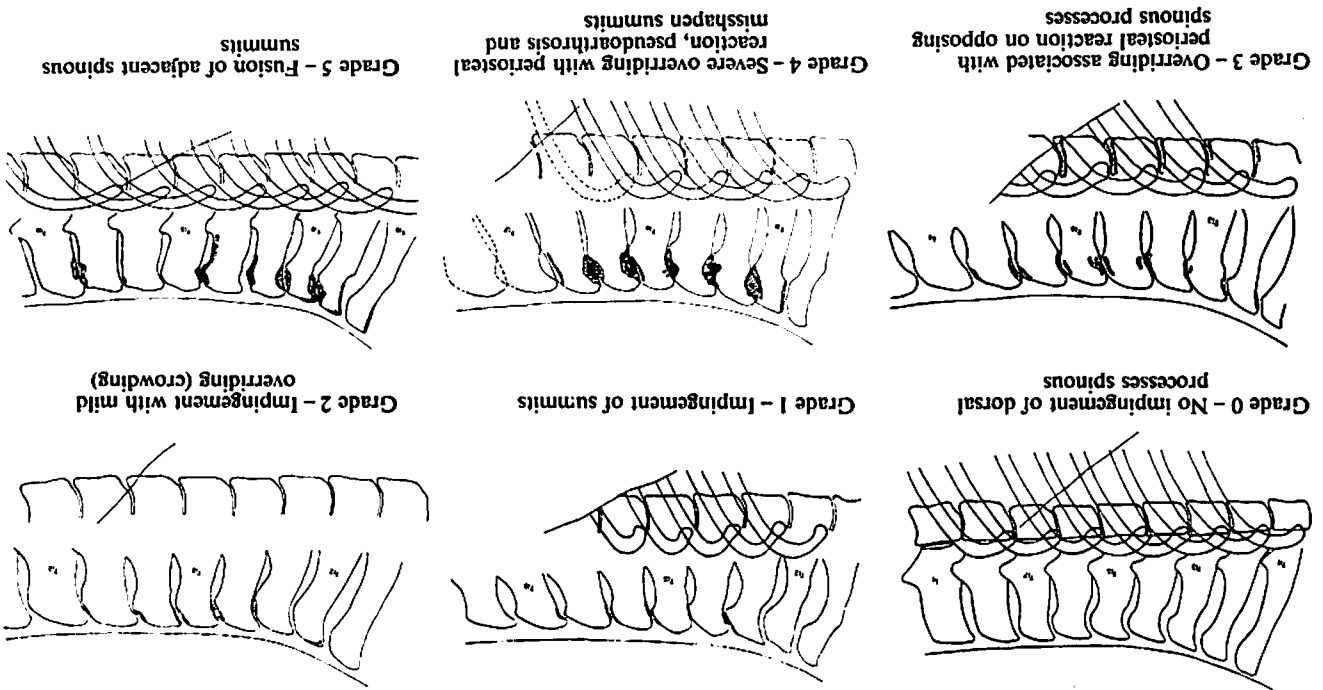


Fig 11b. Depicts the line drawings from the radiographs of these cases

vertebral column while the clinical signs are more associated with the type of work performed. Animals at rest or those kept in very light work will not show overt back pain but will probably exhibit a somewhat rigid TL spine. Animals that are predisposed to maximal spinal flexion and extension (ie, during jumping) will be prone to back pain if the impinging spines are jarred and the pseudoarthrosis traumatised. Most cases should, therefore, respond to periods of rest to allow this painful reaction to subside but recurrence of the clinical signs may take place.

OTHER BONY DEGENERATION

There were only 2 cases in this category. The first was a 3-month-old Thoroughbred foal that had a large draining

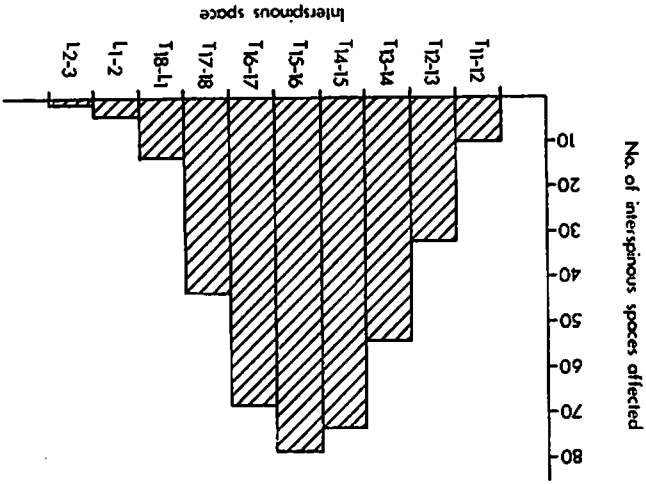
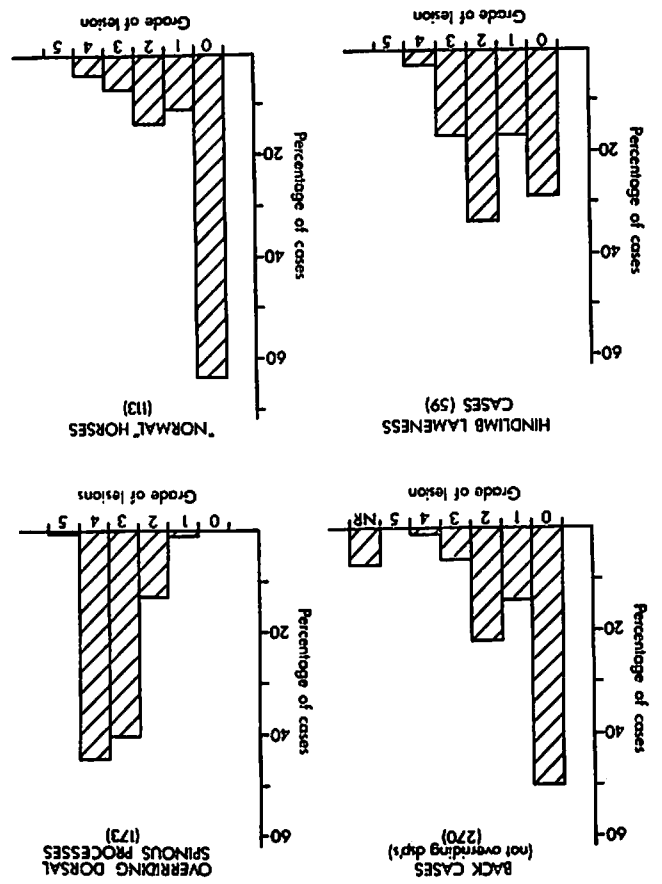


Fig 13. The location and frequency of the interspinous spaces involved in 100 cases of overriding of the dorsal spinous processes

Fig 12. Comparison of the degree of overriding in horses with a thoracolumbar disorder, overriding of the dorsal spinous processes or hindlimb lameness, and the group of normal horses



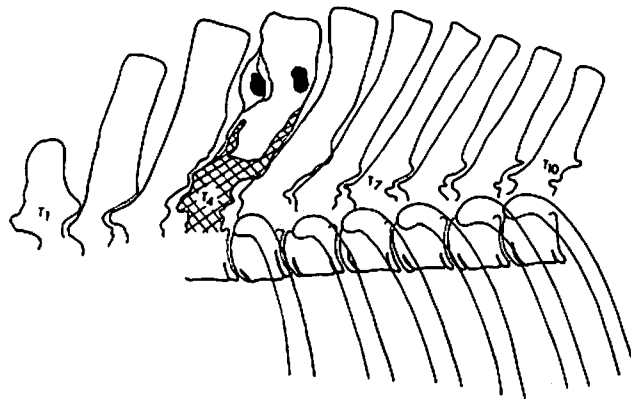
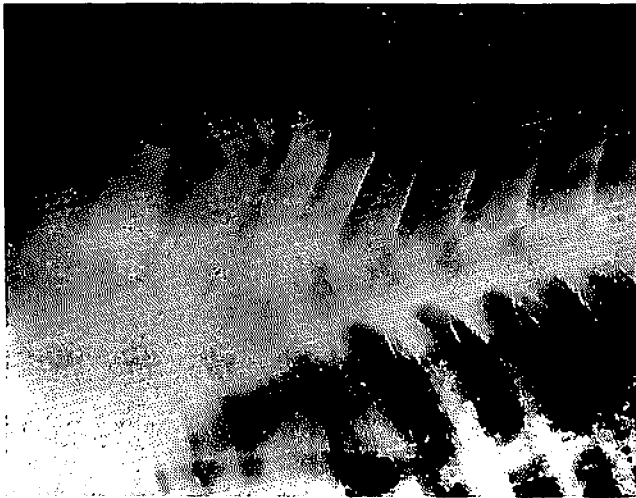


Fig 14. Radiograph and explanatory diagram of cranial thoracic spine of a 3-month-old Thoroughbred foal showing osteomyelitis of the dorsal spine of T_4 .

sinus on its right withers. Radiographs revealed osteomyelitis involving the mid-portion of the spinous process of T_4 (Fig 14). The condition improved with treatment for 2 months and then gradually deteriorated until destruction of the animal became necessary.

The second was a 5-year-old gelding showjumper which had recently begun serious schooling and jumping work. It showed discomfort in the back and reluctance to jump. The only radiographic finding was an area of osteolysis on the cranial edge of T_3 (Fig 15). The exact significance of this lesion was uncertain and, so far, no follow-up information on the case has been forthcoming.

MISCELLANEOUS CONDITIONS NOT SPECIFICALLY INVOLVING THE TL SPINE

There were 66 horses in the series in which no evidence of actual damage to the TL spine or its associated structures could be found (Table 1). In 20 of them some stifle or hock problem was diagnosed and in a further 11 the clinical signs were attributed to lameness originating below the hock or carpus (eg, laminitis, navicular disease and ringbone). In the 9 cases in which the stifle was involved, 7 were ascribed to intermittent or partial fixation of the patella. In the 11 horses with a hock lesion this was due to either low grade osteoarthritis or local ligamentous damage.

There were 24 cases in which all or part of the clinical signs

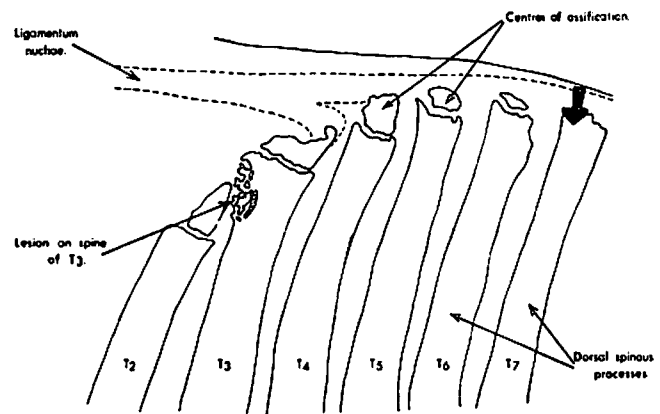
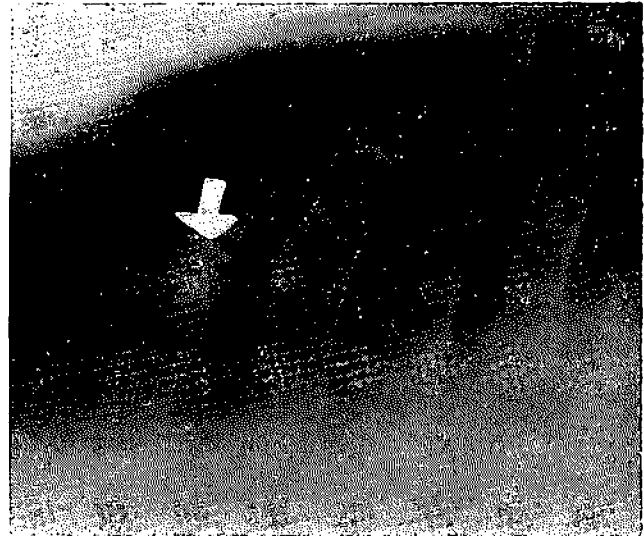


Fig 15. Radiograph and explanatory diagram of cranial thoracic spine of a 5-year-old gelding showing an area of active osteolysis of the summit of T_3 .

were attributed to the animal's temperament. In 15 of these horses some other more tangible lesion was also present (Table 2) but in 9 cases no other demonstrable sign of back injury could be found. The history usually suggested a previous TL problem which had apparently resolved but the animal's performance had not improved or there was still resentment to palpation or taking weight on its back.

Another cause of lowered performance which was confused with a TL disorder was that associated with a dental problem (4 cases), while 3 of the remaining cases involved damage to the cervical spine. In addition one case each of fractured 17th rib, arthritis of the hip, stringhalt and warble-type lesion on the back behind the saddle were recorded.

UNDIAGNOSED

There were 37 cases referred as having a back complaint in which no definitive diagnosis could be established at all (Table 1). These horses usually exhibited some loss of performance with discomfort in the back or signs of having a "cold back". No specific clinical or radiological abnormality could be found for the presenting clinical signs. They may possibly have been associated with some low grade tissue damage, undiagnosed peripheral nerve root lesions or simply due to problems of temperament or equitation.

Discussion

This series of 443 cases appears to be the first attempt to categorise the major causes of back complaints in the horse. A wide range of conditions was found to be involved, although diagnosis was often complicated by the imprecise clinical picture and the individual variation in the amount of pain exhibited by different animals. The most consistent feature noted was, undoubtedly, a loss of performance, particularly jumping performance. The value of good radiographic technique was not only helpful in pin-pointing the presence of vertebral lesions but was also most valuable as a prognostic aid, by being able to eliminate the possibility of serious bone damage.

The incidence of epaxial soft tissue injury was 38.8 per cent, which is high, especially as the majority of cases examined were referred principally for examination of suspected vertebral damage.

The problems of diagnosis, necessitating a careful clinical approach to horses with potential back problems, were emphasised by:

- (1) the relatively large number of cases encountered that were not attributable to actual damage to the TL spine;
- (2) the range of possible conditions;
- (3) the fact that more than one condition or site of injury could be involved at the same time;
- (4) the limits imposed by the need to evaluate, objectively, the degree of pain and its exact location.

In some horses the TL condition was responsible for a loss of performance without any demonstrable pain response (eg, chronic sacroiliac strain). However, some animals were naturally sensitive or "thin-skinned" over the back and palpation resulted in an exaggerated response to dorsiflexion which could be misinterpreted as pain. Cases suffering from the syndrome commonly referred to, colloquially, as a "cold back" were found to be persistently hypersensitive over the back with "stiffness" and dipping of the spine on being mounted. There were usually no other demonstrable clinical signs and no radiological changes were to be found in the TL spine. The initial signs of stiffness on being saddled or mounted wore off within a few minutes and, thereafter, no effect in performance was noted. Whether this condition was actually painful or associated with previous back pain, or was merely a matter of temperament, was not clear.

Definitive diagnosis is often difficult even with recourse to sophisticated radiographic back-up but when it is based purely on a clinical examination it must be largely a subjective assessment of the situation. This inevitably leads to the wide variation in veterinary and lay opinions and speculation of the various pathogeneses of equine back problems.

The condition referred to as chronic sacroiliac strain is an important cause of back trouble or loss of hindlimb performance. The clinical signs, biomechanics and post mortem findings have been discussed previously (Adams 1969; Rooney, Delaney and Mayo 1969). The major clinical sign in many of the chronic cases in this series was a lack of impulsion from one or both hindlimbs at slower paces. However, if the animal was made to jump or exercise at speed the tone of the gluteal and sublumbar muscles would be much increased and the animal's performance improved. The inference being, perhaps, that at slower more relaxed paces there was a mild instability at the sacroiliac joint which in time will lead to slight laxity and great movement of the joint surfaces. The post mortem findings in the 2 cases seen here suggest that there has been some increased mobility of the joint. For the horse to get maximum impulsion from the

hindquarters there should be no appreciable movement taking place at the sacroiliac joint.

It is hoped that this study may stimulate interest and further investigation into the general field and pathogenesis of equine back problems so that a rational basis for therapy can be established.

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Résumé

Il s'agit d'une étude portant sur 443 chevaux confiés au département clinique de la Station de Recherche Equine de Newmarket avec des commémoratifs de lésions thoracolombaires (TL). La gamme des lésions pouvant engendrer des troubles dorso-lombaires est vaste, et 75 animaux, soit 17% furent trouvés porteurs de deux ou de plusieurs lésions distinctes. En revanche, 103 chevaux (19.7%) se révélèrent indemnes de lésions vertébrales ou paravertébrales thoracolombaires. Pour 66 de ces animaux, les signes cliniques furent attribués à diverses sortes de boiteries postérieures. Pour les 37 autres, on ne put produire un diagnostic spécifique.

Des lésions des tissus mous furent diagnostiquées dans 203 cas (38.8%), le site le plus fréquent étant le long dorsal, et, ou le ligament sus épineux dans la région postérieure du garrot ou dans la partie antérieure des lombes. Des lésions sacro iliaques chroniques ou une instabilité sacro iliaque modérée furent également considérées comme la cause fréquente de troubles dorso-lombaires chez les chevaux de compétition. Les autres affections identifiées furent le syndrome tying up (myoglobininurie fruste), la sub-luxation d'une vertèbre lombaire et la névrite de la queue de cheval (cauda equina).

Quinze cas de malformations vertébrales furent identifiés (2.9%) y compris des cas de lordose, scoliose et cyphose. Des lésions vertébrales furent diagnostiquées dans 38.6% des cas, soit 202 animaux. Le cas le plus fréquent était le rapprochement ou le chevauchement des apophyses épineuses dorsales dans la région thoracique postérieure et dans la région lombaire antérieure. Ce diagnostic fut le plus souvent posé

chez les chevaux de concours hippique (173 cas), et l'on constatait une perte de souplesse et de flexibilité rachidienne. Il en résultait des performances amoindries et des signes de douleur dorsale. Les fractures furent peu nombreuses (13 cas), et les spondylites dégénératives au nombre de 14.

Zusammenfassung

Diese Uebersichtsuntersuchung umfasst 443 Pferde, die in die Klinik der Pferdeforschungsstation wegen Rückenbeschwerden eingewiesen wurden. Eine grosse Anzahl von Veränderungen kann Rückenprobleme schaffen und mehr als eine Krankheit oder mehr als eine veränderte Stelle wurde bei 75 Tieren festgestellt (17%). 103 Pferde (19.7%) wiesen keine nachweisbaren Schäden der thorakolumbalen Wirbelsäule auf. Bei 66 dieser Fälle, konnten die klinischen Zeichen einer Nachhandlahmheit verschiedener Art zugeschrieben werden, bei 37 Pferden konnte keine spezifische Diagnose gestellt werden.

Weichteilschäden diagnostizierte man bei 203 Fällen

(38.8%), meistens im m. longissimus dorsi und/oder im supraspinalen Band des hinteren Widerrists und der vorderen Lumbalregion. Chronische sacroiliacale Zerrungen oder milde sacroiliacale Unstabilität waren ebenfalls häufige Ursachen hinterer Rückenleiden von Leistungspferden. Andere diagnostizierte Krankheiten schlossen Tying-up, Subluxation von Lendenwirbeln und Neuritis caudae equinae ein.

Fünfzehn (2.9%) Fälle von Wirbelmissbildungen umschlossen Skoliose, Lordose und Kyphose. Wirbelschäden machten 38.6% (202 Fälle) der Diagnosen aus. Am häufigsten konnte eine enge Stellung oder ein Uebereinandergreifen der Dornfortsätze der hinteren Brust- und vorderen Lendenregion festgestellt werden. Dieser Zustand fand sich besonders oft bei Springpferden (173 Fälle) und verursachte einen Verlust der Losgelassenheit und der Wirbelbeweglichkeit, was schlechtere Leistungen und Anfälle von Rückenschmerzen hervorgerufen hat. Es fand sich nur eine vergleichsweise tiefe Frequenz von Frakturen (13 Fällen) und von degenerativer Spondylose (14 Fälle).

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ABSTRACTS

Immunology

The immune response of horses to tetanus toxoid

JANSEN, B. C. and KNOETZE, P. C. (1979) *Onderstepoort J. vet. Res.* 46, 211-216.

THIS paper reports on a controlled study of the serological effects of tetanus toxoid administration to adult horses, pregnant mares and young foals. The toxoid was prepared from *Clostridium tetani* strain 761 in a water-in-oil emulsion. The local effect of the toxoid when administered intramuscularly was ascertained in 4 horses. These animals were given a double dose of vaccine and slaughtered from one to 6 months later. No pathological changes were found in the musculature at the injection sites.

Two groups of 5 susceptible mares were dosed with 8 and 16 Lf tetanus toxoid in water-in-oil emulsion (1 Lf \approx 1 iu). The serological response was somewhat lower for the 8 Lf dose rate, but both reached a peak 4 to 6 weeks after injection which provided a sound immunity for at least 128 weeks. A booster dose of 8 Lf toxoid in aqueous solution produced an anamnestic response and gave further protection for at least 3½ years.

Toxoid administration to foals from 2 days to 8 weeks showed a distinct lack of antigenic response. This was seen whether or not colostral antibodies were present in their systemic circulation. The transfer of colostral immunity in 10 vaccinated mares was also monitored. Protection was provided to the foals for 10 weeks after birth. An intramuscular injection of 8 Lf toxoid in water-in-oil emulsion to these foals when they were 10 to 18 weeks of age did not elicit any antibody response. However they did respond to a booster injection of 8 Lf toxoid in aqueous solution 12 weeks after the first dose.

L. B. JEFFCOTT

Nervous system and diseases

Spinal ataxia in horses caused by synovial cysts in the cervical spine

GERBER, H., FANKHAUSER, R., STRAUB, R. and UELTSCHI, G. (1980) *Schweiz. Arch. Tierheilk.* 122, 95-106.

SIX cases of synovial protrusions in horses from 4 to 8 years of age are reported. Five of the lesions were located between C₆ and C₇ and one between C₅ and C₆. In 5 horses the cysts were more or less isolated from the vertebral joints, but in 3, a narrow communication with the joint existed. One other cadaver showed the protrusion from the right dorsal joint capsule when the cervical vertebrae were positioned vertically. Compression by the bulging joint capsule was considered, in this case, probably to be only temporary.

Clinically all cases showed severe spinal ataxia with a history of one day to 5 weeks before hospitalisation. Three of the horses had a stiff, laterally flexed neck and all showed difficulties in lowering the head or holding it high. Skin sensitivity of the neck region was diminished unilaterally in one and bilaterally in 5 horses. A battery of laboratory tests including investigation of cerebrospinal fluid yielded no useful results and radiographs in 4 cases were inconclusive.

The autopsy of the cervical vertebra showed normal results in 4 cases, a degenerative osteoarthritis in one and an old fracture of C₆ in another case. Compression of the cord was visible but not marked in 5 cases and the histopathological examination showed myelomalacia of varying degree at the compression site and secondary degeneration due to circulation impediment cranially and caudally. Histopathology confirmed that the cyst-like formations were synovial structures.

P. D. ROSSDALE