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ESSAY

CONFORMATION DEFECTS

CONCERNING THE FARRIER &

CORRECTIVE METHODS

Enc:

INTRODUCTION

My thesis is based on some of the main conformation defects of the horse's front and hind limb, and how I endeavour to help correct them.

Firstly I should like to describe how both good and bad conformation arises and also the importance or correcting faulty conformation as early as possible.

I hope to show some of my own ideas of corrective shoeing which I have found to be successful and also to describe how important it is for the farrier to unerstand the anatomy of the limb concerning him. In such cases as conformation defects it is important that the farrier and the veterinary surgeon work together and discuss the best remedy and understand the anatomical problem.

HEREDITARY CONFORMATION

An owner who has decided to put a mare in foal must first study the animal, particularly it's bone action, feet and especially conformation. She should be put to sire, which is going to produce a well balanced strong foal. For example if the mare is fine boned or toes out or has any other defects it should be sired to counteract them and try and produce the perfect foal.

When a mare is sent to stud, it is the combination of the mare's egg cell uniting with the sire's sperm cell, which determins the sex of the foal. These cells together are known as chromosomes and are minute thread like structures, it is these which determin the hereditary characteristics. Each of these chromosomes consists of hundreds of molecules of nucleo-proteins these are called genes. It is these genes which go to make up the colour of the animal whether it will have black or white feet, they all have the job of growing and producing a certain part of the foal, therefore it is a fact that any deformities in either sire or mare con be hereditary and these hereditary faults may even be produced before birth. It has been proved that deformities can be a nutritional deficiency.

During the time of confinement in the mother's womb, the bones are made of cartilage and are still soft. That is why when a foal is born and stands up at first it's legs are unstable. Through time this cartilage forms to bone and it is most important to do any corrective trimming properly before maturity. The bones below the knee and hock although not fully formed to full density of bone, are at their full length by the age of eighteen months, explaining why foals up to this age look so long legged and almost out of proportion waiting for the rest of the body to catch up. For it to be effective any corrective methods made to young horses are better done before the epiphyseal cartilages near the ends of the bones become ossified. This ossiffication takes place depending on the breed of animal between eighteen months and two years.

In order to correct a fault, one must first study the horse standing still on level ground, at a walk and then a trot going away from you, coming towards you and from the side. From these angles one can take note of the joints alignment from the front and notice if the hoof pastern axis is correct. The breaking over point in the foot must also be considered.

When trimming, the farrier must balance the foot on the limb. If the horse goes straightit is a matter of making sure that the pastern axis is approximately one hundred and thirty five degrees on the front and one hundred and forty five degrees on the hind limb. The foot axis should be forty five degrees front and approximately fifty degrees hind. If the pastern axis is less than one hundred and thiry five degrees this means a sloping pastern the breaking over of the foot is delayed and there is a slight increase of stride, termed daisy cutting.

If the axis of the pastern is more than one hundred and thiry five degrees (ie. upright) the breaking over is sooner and the horse tends to lift higher which decreases the length of the stride.

Toeing In

Trimming of foals which are toeing in from the fetlock. I find if trimming starts at three to four weeks old and trimmed every month thereafter I can help the horse greatly. This is a slow process which cannot be corrected in one trimming but will improve every time when trimmed.

The foot when toeing in will be high on the inside and the outside will be worn. The break over point of the foot will be on the outside toe quarter and the wall will be visibly worn at the point of break over. Correction of this fault if not too severe can be rectified by balancing the foot and trimming the inside down, which will correct the break over and bring it closer to the centre of the foot. In most cases there will be a flare on the inside wall which should be removed within reason to correct the balance of the foot on the limb.

If the foot is toeing in so much and the outside is excessively worn it will be necessary to fit a special shoe. The shoe which is most successful is thicker on the outer side and tapering round and finishing at the inside quarter. When preparing the foot, lower the inside as done in corrective trimming. When fitting the shoe it should be full on the outside and slightly longer than the foot, this will encourage the growth outwards. The inside should be fitted close but not entirely under the wall. The shoe although tapered should be level on the ground surface and also the foot surface, and should be fitted to the foot accordingly. The reason for this being when the horse stands on level ground with the shoe on, there will be a definite reaction to the correction, whereas if the shoe was not level on the ground surface there would be an uneven rocking motion from the inside heel to the outside toe.

As the foal grows it will be necessary to fit a full shoe although it should still be tapered and level on the ground surface. The full shoe will give more cover whereas the three quarter shoe loses bearing surface on the inside heel. Eventually a normal shoe may be fitted as the motion improves.

The term used for a horse's action which toes in is paddling, the reason for this, it breaks over on the outside and throws the foot outwards and in a circular motion back to land.

THIS SHOWS A FOALS RIGHT FOOT WHICH IS SHOD TO CORRECT A DEFORMED LEG WHICH WAS TOEING IN FROM THE FETLOCK JOINT.
THE SHOE APPLIED IS THICKER ON THE OUTSIDE TAPERING ROUND AND FINISHING AT THE INSIDE QUARTER.

Toeing Out

Foals which have this conformation fault have an action when trotted called winging, this is caused by the break over point of the foot being at the inside to quarter and when in flight crosses in front of the opposite fore leg and then back out to land. The foot will be high on the outside and the inside may be rolled under at the heel.

To correct this fault the outside should be trimmed down and if the hoof is excessively flaring to the outside, the flare should be removed within reason. The foot should be trimmed to balance it and correct the breaking over point and if this is done regularly the flight will come correct and straight.

If the inside is excessively worn and the toeing out is severe it may be necessary to fit a special shoe. The shoe suitable should be similar to that for toeing in, only the outside should be thinned and the inside left thicker. The shoe should also as mentioned be level on the ground surface and also the foot surface and should be fitted accordingly.

If these shoes are removed regularly and if the horse is young enough there will be a vast improvement to the horse's stance and action.

Off Set Knees Or Hocks

This is a condition which is hereditary, a nutritional deficiency or just a deformation of the limb at birth. In some cases the condition improves as the foal grows in others it gets worse.

The problem being the knees or hock is either bow legged, cow hocked or knock-kneed. The importance of correcting this as early as possible, is because the body weight of the horse should be evenly distributed on the joints, if this is not so and the weight is more to the inner side or outer side, there is a compression of bones at one side and a pulling or tearing force of lateral ligaments at the other side of the joint. Due to nature the centre of gravity on the individual limb is slightly to the inner side, this is the reason for the bones being slightly more dense, in the medial aspect.

This condition of offset knees can also be that the two layers of carpal bones are not in line with the result of the radius being in line with the shoulder and the metacarpal being in line with the phalangial bones but not lining up at the knee.

There are a number of ways to correct these conditions and it is important for the vet and the farrier to work together and understand the anatomical problem.

Plaster castings are very successful in the young animal and can be corrected to almost perfection. But in some cases the epiphyseal growth centres are damaged causing the bone to grow more on one side than the other. This can cause permanent deformation. In such cases epiphyseal stapling is more successful. After the foal is approximately two months this epiphyseal stapling has more success than the casting, although stapling can begin as early as two weeks. The reason for stapling is, if the bone growth is more on the medial aspect causing knock-knees the staples are placed on that side, this slows the bone growth on the medial side and allows the lateral side to grow and catch up.

The cause of this growth on the medial side and lack of it on the lateral is because more mass body weight was distributed on the lateral side compressing the epiphyseal limit and the reduction of weight on the medial allowed it to grow faster.

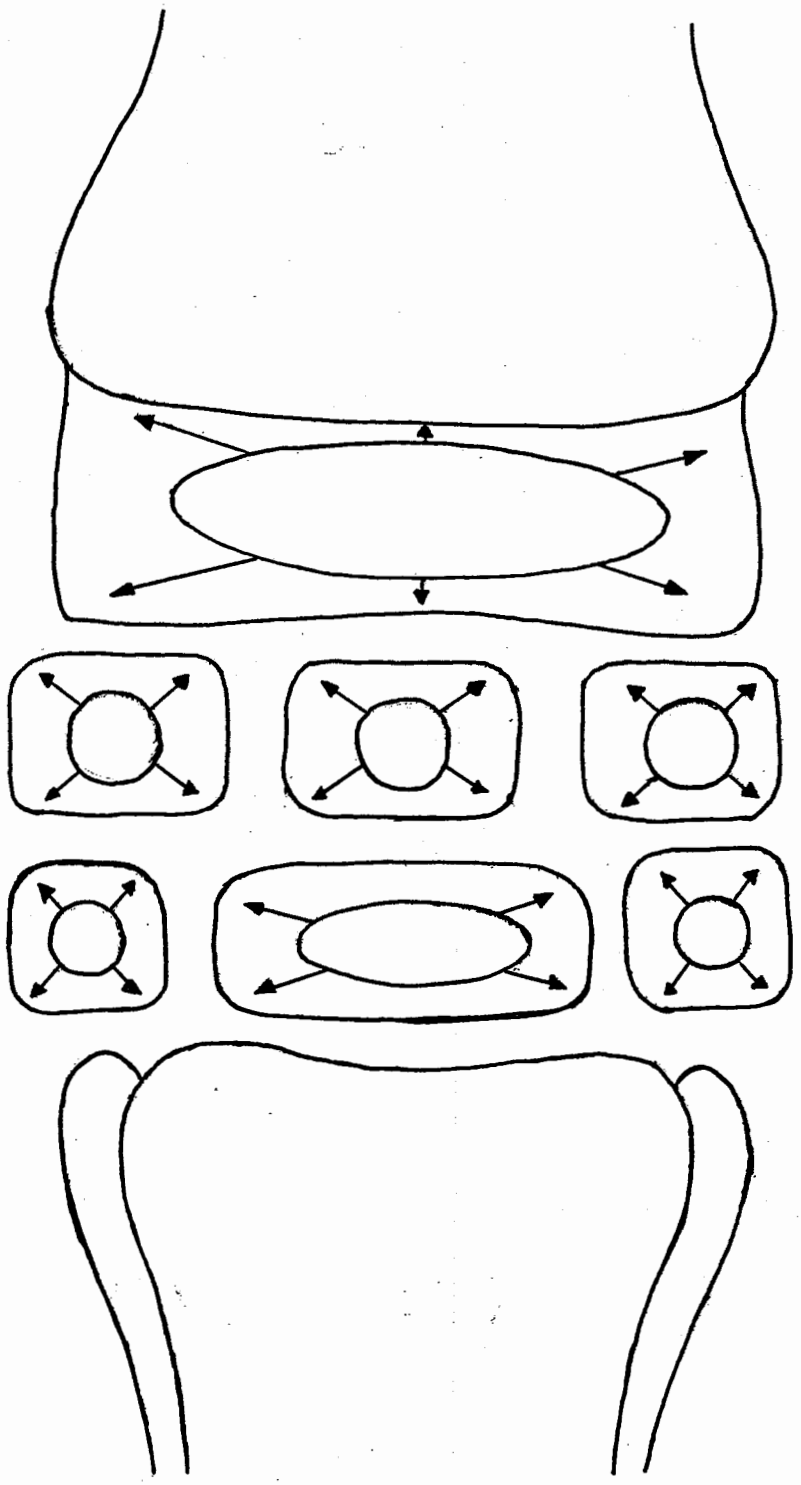
The foal's feet as with any other deformity at this age should be trimmed to correct the limb. The reason for this is, most horses feet can be trimmed level and balanced at any age but there is not much you can do to straighten a deformed limb after the age of eighteen months to two years. So my theory is to first of all correct the alignment of the limb by corrective trimming and the foot can be balanced later, when the limb deviation is corrected.

An experienced farrier can tell a horse's action and stance by studying the foot, if the foot is high on the inside this indicates a toe in stance with paddling action or the horse is bow-legged. If high on the outside this indicated toe out stance with winging action or the horse is knock-kneed. But this is just an indication and it should be remembered it is always better to see the horse out on level ground and study its action as mentioned.

Corrective trimming is a must in such cases of off-set knees especially when stapling has been applied. The staples will be removed when the growth rate has reached the same stage at both medial and lateral sides and it is advised that the foot be trimmed to ensure that the weight is being distibuted evenly on the carpal joint.

Corrective Trimming and Shoeing

Although these technics of casting and stapling are useful they are also very expensive, time consuming and require a surgical facility and expertize. Perhaps the simplest, least expensive and often most effective method is an alteration of the foot or feet in such a way as to direct limb flight and foot contact position. Young acively growing bone is responsive to the stresses applied to them. By altering the foot, its landing position and swing configuration, an attempt is made to determine the stresses and the pattern of bone growth.



A shematic representation of the left carpus of a one day old foal. Note the arrows radiating from the spherical ossification centers of the distal radial epiphysis and carpal bones. These arrows indicate the progressive pathway of the endochondral ossification.

ANGULAR LIMB DEFORMITIES IN FOALS

MAL-POSITIONING IN UTERO
{WIND SWEPT FOAL}

FLACCIDITY - LAXITY OF PERIARTICULAR SOFT TISSUE

POOR APPENDICULAR CONFORMATION

DEFECTIVE OSSIFICATION OF CARTILAGINOUS PRECURSORS - TEMPLATES OF CUBOIDAL BONES
"IMMATURITY"

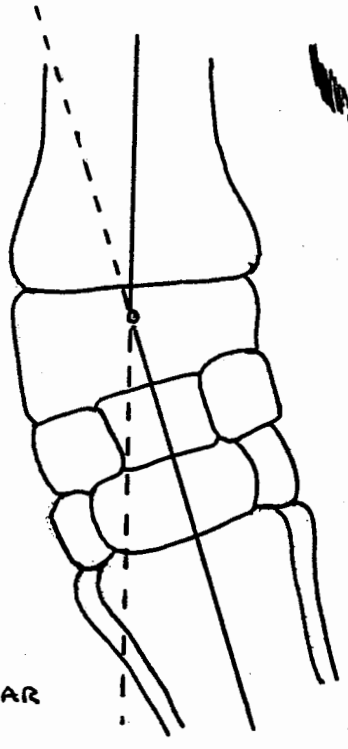
VIOLENT EXTERNI TRAUMA

OVER - NUTRITION
HEAVLY MUSCLED
EXCESSIVE ACTIVITY
HARD GROUND

TRAUMA
WIRE CUTS
LAMENESS

TRAUMA TO GROWTH PLATE FROM CONCENTRATION OF AXIAL LOADING FORCES

RETARDED LONGITUDINAL BONE GROWTH ON THE CONCAVE SIDE OF THE GROWTH PLATE - THAT AREA SUBJECTED TO CONCENTRATED AXIAL LOADING



DEVELOPMENTAL ANGULAR LIMB DEFORMITY

FLOW CHART SHOWS THE ETIOLOGIC FACTORS THAT CONTRIBUTE TO AN ANGULAR LIMB DEFORMITY.

Knock-Knees

Foals which have this deformation, stand with their knees close together and tend to give a toe out impression. Again if trimming starts early enough this can be helped greatly, as mentioned it is important to distibute the weight mass evenly on the joint. In this condition of knock-knees there is a compression of the bones on the lateral aspect of the knees allowing the bone to grow faster on the medial sides.

To correct this the out side of the foot should be trimmed down, this should be done within reason and should be trimmed regularly to try and prevent this compressing on the lateral side of the joint.

If the deformation is bad enough a surgical shoe should be applied, the shoe should be thick on the inside tapering down and finishing at the outside quarter and eventually a full shoe still tapered should be fitted. The shoe should be fitted in the same way as toeing out and the amount of thickness at the inside heel all depends on the severity of the deformation, but I suggest this is a gradual operation and not a fault which can be corrected in one shoeing.

Bow-Legged

This is a term used when the knees are wide apart and the feet are giving a toeing in impression. In foals of this condition there is a compression of the bones on the medial aspect of the carpal joints and excess strain is placed on the lateral ligaments of the joint. This allows the new bone to grow faster on the lateral aspect.

To correct this fault and enable the weight to be distributed evenly on the joint, the inner side of the foot should be trimmed. In doing this it should prevent this compression and take the excess strain off the lateral ligaments.

Trimming as mentioned should be done regularly and if necessary a surgical shoe should be fitted. The shoe in this case should be high on the outside and tapered to the inner quarter, and fitted on the same manner as mentioned in toeing in. Again it is better to do a little corrective trimming often than do too much at once.

THE HOCK

Bone Spavin

Bone spavin is an osteoarthritis or exostosis of bone on the lower and medial aspect of the hock. It most commonly concerns the intertarsal and tarsometatarsal joints. The bones usually involved are the central tarsal, third tarsal, third metatarsal and the first and second tarsals which are already fused together. The problems and pain are caused when these joints form ankylosis and then leaving the osteoarthritis. It is estimated that less than fifty percent of horses which are lame due to bone spavin make a useful recovery under treatment.

Causes

The causes of bone spavin is a fault in conformation such as sickle hocks or cow hocks. It is also a hereditary disease, today it is most commonly caused by concussion or horses being worked too hard so young. Horses being made to over exert the hock or being pulled up quickly, such as jumping horses. The disease is more common in horses than in ponies, although both stand a risk. If the body weight of the horse is not evenly distributed on the medial aspect of the hock joint then excess stress is placed on bones, ligaments and bursa, which through time can break down. Normally it is the inner aspect of the hock joint which gets damaged due to the centre of gravity or mass weight medial line being nearer the inner part of the limb than the outer, causing a compression of the third tarsal and central tarsal bones.

Symptoms

One will be able to see when the horse moves off after rest, there will be imperfect flexibility of the affected leg and the stride of that leg will also be shorter, lameness will disappear as the horse gets warmed up or moves more. But will recur after rest again. Because of the imperfect flexibility there is a lower arc of the foot in flight and forcing the toe to drag. The front edge of the toe will in time become squared off and the severity of this depends on how much pain occurs when the horse flexes the hock and how high the flight arc is. The heel of the foot will become high as the horse is using the toe more and will find it more comfortable if left this way. In very severe cases, exercise may aggravated the lameness and the toe dragging may increase.

In bone spavin there will be a bone enlargement on the lower inner aspect of the hock if the spavin test is done, which consist of, flexing the affected leg for a minute, the horse will if spavin is present, when trotted will show immense signs of lameness instantly which will ease off depending on the extent of the bone enlargement.

Shoe

In bone spavin the type of shoe is one which conforms to the way the old shoe wears. The toe of the foot when trimming should be shortened and the toe of the shoe to be fitted should be rolled to the extent of the toe dragging. The toe rolling on average should be at forty five degrees. The shoe should have long sloping wedge heels not calkins as this would cause a jarring motion and aggravate more pain. The height of heel also is determined by extent of spavin lameness but should be at least twice the thickness of toe, and have a long sloping wedge. The horse will be shoed when fitting the shoe, short at the toe and longer at the heel to support the heels of the foot.

Occult Spavin

This disease shows exact signs of lameness as bone spavin only the lameness does not wear off with exercise. It is the least common of the spavins. There will be no visable changes but only a form of arthritis due to intra-articular lesions, with ulceration of the articular cartilages of the bones.

There will be a positive reaction to the spavin test and the horse will be continuously lame. The degree of lameness may vary, from time to time but there is no complete remission in the lameness. No enlargement will be found in occult spavin but at times a slight degree of heat may be present.

The foot arc and flight pattern are similar to bone spavin and the toe dragging is also noticeable. The shoe for this disease is exactly the same as bone spavin and the same procedure is used in applying it.

Bog Spavin

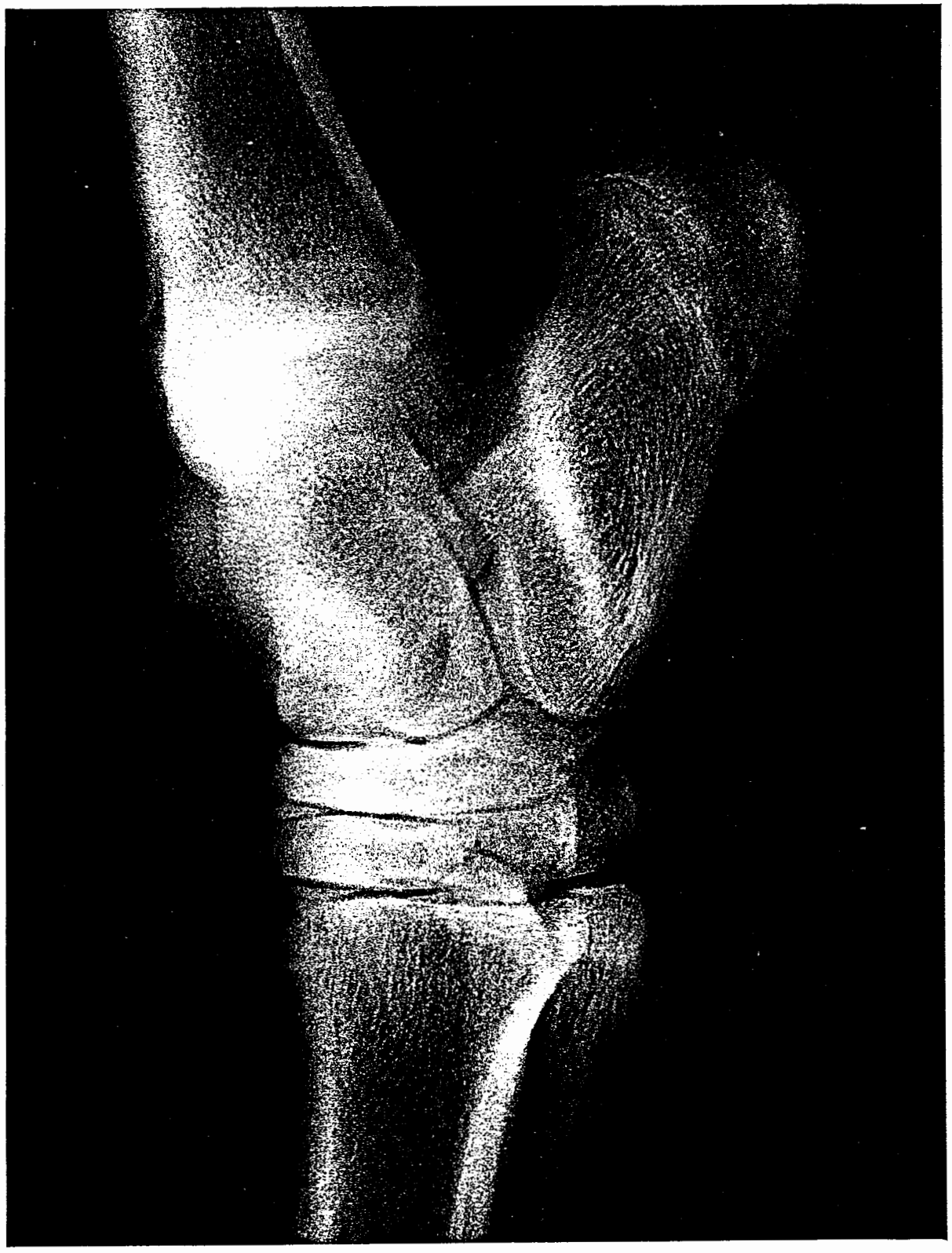
This is a chronic distension of the tibiotarsal joint, capsule or synovia membrane. This condition can be unilateral or bilateral.

The cause of bog spavin can be a conformation fault commonly found on horses which are too straigh at the hock, by that I mean have a large longditudinal axis between the tibia and the large metatarsal. Bog spavin can also be caused by trauma such as turning too quickly or stopping too quickly, this can cause injury to the capsular ligament or other tarsal ligaments.

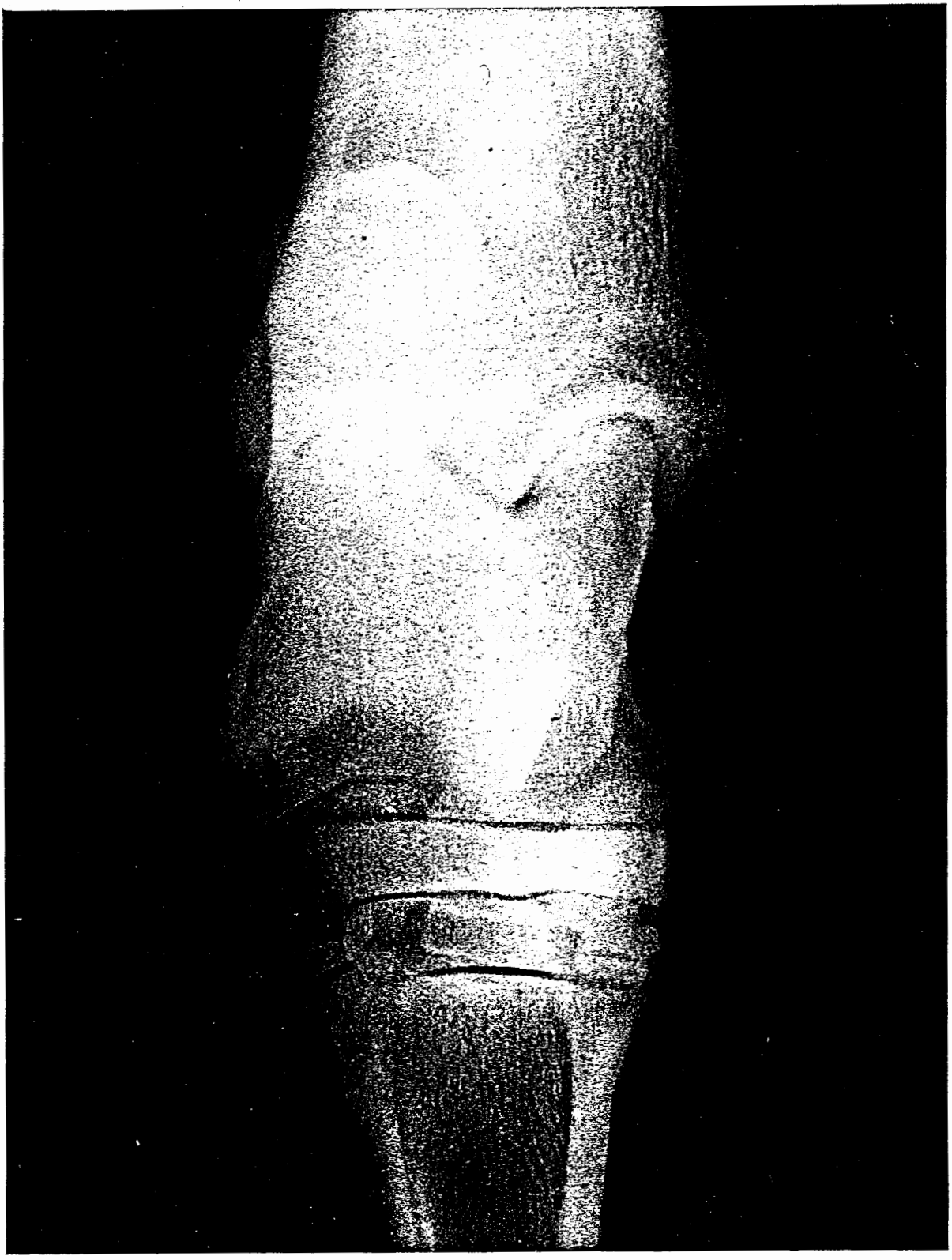
This causes severe swelling on the inner aspect of the hock but in bilateral cases a swelling as also found on the posterior, lateral aspect of the joint. Pain and lameness is only found in bog spavin if caused through injury. But in general bog spavin is a painless cold swelling which can be displaced slightly by pressure. Young horses in particular are affected by this owing to the greater elasticity of the anatomical structures of the hock joint.

It is important to try and find whether the cause of bog spavin is, conformation trauma or nutrition deficiency.

No surgical shoeing should be necassary but in severe cases it will aid the joint if the heels of the shoe are raised slightly be wedging and the toe rolled slightly. similar to that of bone spavin only the toe need not be rolled quite as severe, and the heels may be slightly lower. In this situation the shoe is merely to aid in the breaking over action and help the joint.



RADIOGRAPH OF A NORMAL RIGHT HOCK JOINT OF A MATURE HORSE.



ANTERIO-POSTERIOR RADIOGRAPH OF A NORMAL LEFT HOCK JOINT OF A MATURE HORSE.

Blood Spavin

This is merely the name given to an enlargement of the saphenous vein crossing a bog spavin. This can sometimes occur on its own but never causes lameness or discomfort.

Curb

This is the name given to a swelling and thickening at the posterior part of the hock at approximately three inches below the point of the hock.

There are two types of curb, 'true' and 'false'. The most common and one which is most spoken of is the true curb. This is a sprain of the plantar ligament of the hock and the sprain causes a thickening of this ligament at the posterior and lower end of the fibular tarsal.

Causes

Curb can be caused by fault in conformation such as, sickle or cow hocks, the conditions tend to cause too much strain which causes this injury to the plantar ligament. Horses which over exert the hock by kicking walls or landing on slippery surfaces when jumping causes this sprain. Cart horses being made to back heavy loads are prone to curb purely by over exertion of the hock.

Signs

Lameness will be present along with inflamation on the plantar surface of the fibular tarsal bone. The horse will stand with the toe of the foot on the ground and with the heels elevated. If treatment is effective the horse may be sound in a few weeks but the curb swelling will remain a firm thickening after the horse is cured and sound.

The farrier can help this condition considerably by fitting a shoe with long sloping, high wedge heels, the heels must be wedged and not calkins as calkins will give a jarring grip and will cause more pain. The toe of the shoe should be rolled slightly, mainly to aid in the break over action and to prevent any excess concussion or jarring.

If the sprain is not too severe, the use of plastic wedge pads are a good practice but if the heels require more than half an inch in height a shoe with raised wedge heels is required first. These wedge pads have many uses and in this case help eleviate pain by raising the heels and absorbing concussion. The pad is fitted between the shoe and foot with obviously the thick part at the heels and the tapering thin part at the toe.

I find them very successful in such cases as curb or a sprained flexor tendon when the rest shoe has done its usefulness and has been on long enough for the sprain to heal, if a wedge pad is fitted now with a level shoe it prevents this sudden drop from a rest shoe to a normal shoe. I also find if the toe of the shoe is rolled slightly with the pad on, the horse will break over easier and it will prevent excess jarring and will help absorb concussion when the horse first starts back to work after injury.

Over Expansion Of The Foot

In the following page I wish to describe an every day problem which concerns the farrier and aim to describe may method of shoeing for this condition. Although it is not so much a conformation fault it is a condition which can be hereditaty. Possibly poor care and attention by the owner leaving the shoes on too long or bad practice by the farrier, shoeing too short not allowing any support for the posterior part of the foot, is the most common cause. But in the following I am talking about the horse which has been cared for and shoed properly every month and just has natural low weak heels and flat looking feet.

In my experience I have came across a number of horses with over expansion. This condition I found was mostly on the fore feet. The horse in this condition has flat looking feet, the soles are thin, ie. 'yield under the slightest thumb pressure'. The heels are weak and tend to curl in excessively from the heel quarter. The bars are very short by short I mean they do not go with strength or substance to the point of the frog and in some cases appear non existing. With the heels being weak getting no support from the bars the sole is very prone to getting corns and bruising. The frog is very prominent therefor when the horse puts its foot down, the over expansion process begins. The frog in turn displaces upward and pushes the plantar cushion to displace outwards onto the flexible lateral cartilages and back to the bulbs.

I have found that the reason the heels are so low especially on the shoed horse with normal shoes on, is with the excessive movement the heels on the hoof are being worn with constant friction on the shoe. I found there was a small concave worn on the solar surface of the shoe where the heels would be. It proves that if a worn mark appears on this part of the shoe, think how much of the softer material horn is being worn away and weakened by friction.

I also found with normal shoes on the heel, nails would always be broken within ten days of shoeing, the inside nails would break first no matter how near the toe quarter I put them, the heel nails always broke.

To solve the problem of the heels wearing, I had to put two quarter clips on the shoe, one on the inside heel quarter and one on the outside heel quarter. The shoe had to be made from broad metal, my reason for this is to enable me to fit the shoe long and wide at the heels, this is to allow for some displacement and to support the heels and lateral cartilages and enable the horse to absorb as much concussion as necessary.

The shoe can be fitted with a centre clip at the toe or the toe can be rolled depending on that particular horse's action. By putting on two quarter clips this has also solved my problem of the heel nails breaking. But I find it is better to keep my nails forward in a shoe of this kind when fitted with quarter clips, because I do not wish to imobilize the foot altogether all I have done is prevent over expansion.

The foot must be allowed some displacement to absorb concussion. Through time the heels will grow and the foot will become concave and form a strong crescent shape with the toe and heels forming a three to one ration.

Conclussion

The preceding pages have shown the importance of trying to breed the perfect foal, and some of the good and bad hereditary characteristics which are passed on.

Showing the effect poor foot care, neglect and unlevel trimming has on the foal and explaining some corrective methods which have proved to be successful. Mentioning why correction to any limb deviation should be done as early as possible while the bones are still young and growing and responding to corrective treatment. It also explains the need for keeping the mass body weight evenly distributed on all joints especially the knee and hock.

In theory when shoeing the farrier should try and do his best with what he has under the conditions in which he is working.

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