

---

**The Peter Wilson Bequest Lecture**

***Speaker: Nick J. Wingfield Digby***

**Practical Management of Growth Problems in Foals**

*23<sup>rd</sup> September 2008*

---



## Practical Management of Growth Problems in Foals

Taken from the 2<sup>nd</sup> Waltham International Breeding Symposium

*Nick J Wingfield Digby*

### **Summary and Take-home Message**

Growth problems in foals can be grouped into abnormalities present at birth (congenital) and acquired abnormalities. Often interrelated, these conditions require assessment and management through careful control of exercise and nutrition. More severe cases will require veterinary involvement that may include support bandaging, medication and surgical intervention. Early detection and diagnosis of acquired deformities usually result in a more rapid and satisfactory response to treatment and changes in management.

### **Introduction**

Growth problems in foals can be related to abnormalities present at birth (congenital deformities) or to those that become apparent with time and development (acquired abnormalities). Often described as separate entities it is important to remember that congenital deformity may predispose an individual foal or yearling to growth problems. It is, therefore, useful to consider the range of congenital problems before reviewing the acquired musculoskeletal abnormalities, broadly described as developmental orthopaedic disease (DOD).

### **Congenital Deformities**

A number of conformational or angular limb deformities are seen in foals as soon as they are born, stand up and can be critically assessed for the first time. These have been defined as either malformations or deformities. Malformations are disturbances of fetal growth such that organs or parts fail to develop, or do so in an abnormal situation or manner, e.g. polydactyly, anencephaly and microphthalmia. Deformities are conditions in which the limbs or other parts are anatomically complete but are abnormally flexed, extended or deviated possibly, as a result of pressures or restrictions in the uterus, e.g. carpal valgus.

### **Skeletal Malformations**

- **Prognathism**, where the incisor teeth do not meet, may involve the mandible or the maxilla. Occasionally, some 'parrot jaw' foals improve with time as their skull bones grow and develop. Surgical attempts to increase the length of the lower jaw have been reported, but are probably unnecessary as affected individuals can thrive into old age with good dental care.
- **Cleft palate** may involve variable lengths of the hard palate or only the soft palate. Most cases present with milk flowing down the foal's nose immediately after sucking but, occasionally, typical abnormal signs are not seen until much later when recurrent respiratory infections lead to a diagnosis being made during endoscopic examination. Attempts at surgical repair are unlikely to produce a satisfactory clinical outcome.

- **Dentigerous cysts** occur later, appearing as a firm swelling in foalhood or as a yearling, most commonly at the base of the ear, and often respond well to surgical removal.
- **Microphthalmia** (underdeveloped eyeball) can occur bilaterally but is more commonly unilateral. The bony orbit is usually normal and enucleation is usually performed later in foalhood for unilateral cases, if discomfort or irritation develops.
- **Polydactyly, adactyly** and **hypoplasia** of phalanges are rarely seen in foals. Extra digits usually originate at the distal metacarpal level and are best removed later in foalhood.
- **Cervico-vertebral malformations** have been seen in a fetus, but it is not clear that these rare cases contribute to the more common 'wobbler' syndrome found later in foalhood or as a yearling or 2-year old. **Scoliosis** (lateral curvature of the spine) may occur as a malformation, with fusion or incomplete formation of the caudal thoracic vertebrae, or as a deformity. Asymmetry of the rib cage is often noticed soon after birth. Minimally affected cases may improve or adapt to become athletes. **Kyphosis** (roach-back) is often also present. These abnormalities may involve multiple sites. Flexural carpal deformities being the most common. Euthanasia is usually the most appropriate action to take.

### **Skeletal deformities**

- **Torticollis** (wry neck) results in dystocia at birth unless the foal is markedly undersized. The neck is often persistently flexed.
- **Lordosis** (dip back) is not usually diagnosed until later in the foalhood or as a yearling.
- **Rhinocampylus** (lateral curvature of the nose) may affect the whole skull or just the premaxilla, with or without the maxilla being affected. Mildly affected cases often improve with age, as the bones of the skull grow and develop. Severely deviated cases may cause respiratory embarrassment on the convex side and although attempts at heroic surgical treatment have been reported, euthanasia is most appropriate.
- **Limb deformities** most commonly involve joint laxity or musculo-tendinous asynchrony. Bone angulation is less common and most commonly involves the metatarsals (hind cannon bones). In such cases there may be articular and periarticular complications, for example involving the sesamoid bones, branches of the suspensory ligaments and flexor tendons deformity or malpositioning. Attempts at surgical correction, using wedge osteotomy, have been reported but euthanasia is usually the most appropriate course of action.

### **Limb deformities** include:-

- **Flexural deformities** (hyperflexion or hypoextension) are often called 'contracted tendons'. Single or multiple joints may be affected.
  - **Coronopedal/distal interphalangeal joint deformity** (coffin joint) occurs more commonly in the foreleg than the hindleg and foals are often bilaterally affected. The principle for correction is to keep the affected toe forward and not knuckling over, while the foal bears weight and stretches the affected soft tissues. If knuckling cannot be

corrected by simple bandaging, a wrap around orthopaedic splint is the best way to stretch the toe forward without causing pressure sores. Such splints are best left on and taken off intermittently for 2 hours at a time, until no longer required. In some difficult cases, Equilox toe extensions can help to speed resolution by increasing the 'fulcrum' and protecting the toe from excessive wear. An i.v. injection of a high dose of Oxytocin (3g for a 50kg foal) can sometimes have a remarkable overnight effect. It is postulated that it relaxes tendons and perhaps other soft tissues by chelating calcium. The dose may be repeated daily for perhaps up to 3 days in difficult cases. Although the literature reports a case of nephrotoxicity attributed to such treatment, this does not appear to be a common sequel, although serum urea and creatinine levels should be monitored when repeated doses are used. Severe cases may require splinting under general anaesthetic, with or without a wire extension from the toe of the hoof to the cast.

- **Fetlock contracture** occurs in both front and hindlimbs, sometimes in association with coronopedal joint deformity, and is similarly treated to the above. Hind fetlock deformity takes longer to correct than front fetlock deformity because the foal tends to rest the leg rather than bearing weight on it. The hind fetlock area is particularly prone to the development of pressure sores as a result of support casts.
- **Carpal (knee) deformity** more commonly occurs bilaterally and most will slowly resolve with time as the foal exercises, develops, strengthens and grows. More severely affected cases, where radiographic examinations reveal carpal bone triangulation and there is soft tissue abnormality, do not improve and euthanasia is the most appropriate option. Splinting is almost never, and surgery seldom, successful in resolving such cases. Sectioning of the *ulnaris lateralis* and *flexor carpi ulnaris* tendons, just above the level of the accessory carpal bone has been recommended for cases that do not improve by 4 weeks of age. Carpal flexural deformity commonly causes dystocia and is an important cause of full-term stillbirth from *intrapartum* delay and premature placental separation. Vaginal delivery of severely affected foals can be very difficult. Rapid referral for caesarean section is often necessary.
- Tarsal deformity with hocks fixed in 90° flexion is rare and requires euthanasia. Some foals, often those with weak 'curby' hocks, suffer tarsal bone crushing deformity which results in a 'bunny hopping' action and for which the prognosis for recovery is poor. This syndrome is also seen in foals born prematurely and was common in twin foals.
- **Extensor deformities** (hypoflexion or hyperextension) are often associated with prematurity or dysmaturity and usually resolve with time and controlled exercise, as the foal develops and strengthens. Affected foals can be obviously back at the knee, slack in the pasterns with toes of the hooves off the ground pointing upwards.
  - **Coronopedal or distal interphalangeal joint deformity** most commonly involves the hind legs and these may take months, but they usually respond to time and controlled exercise as the foal grows, develops and strengthens. Acrylic and aluminium heel extensions and

protective bandaging for the heels and lower limb are often indicated. Milder cases can often be improved by the farrier trimming back excess horn growth at the toe.

- **Fetlock, carpal and tarsal deformities** usually respond well to time and controlled exercise as the foal grows, develops and strengthens.
- **Angular deformities** commonly involve valgus (outward), varus (inward) or rotation deformities and often occur in association with flexural or extensor deformities. Many resolve with time, as the foal develops, grows and strengthens but those that do not may be helped by remedial farriery and/or surgical intervention.
  - **Carpal angulation** most commonly results in valgus (knock knee) deformity. It is often bilateral and may involve contralateral varus deformity, suggesting an *in utero* moulding deformity. Cases may be affected from birth or may develop or worsen at 2-3 weeks, associated with carpal bone pathology or physitis. Most cases (except those with carpal bone pathology) respond to rest or restricted exercise. Remedial foot trimming and medial EquiloX hoof extensions often help. A decision should be made before 3 months as to whether surgical intervention, with periosteal elevation, transaction or distal radial epiphyseal bridging staples or screws and wires, is required. Shockwave therapy to the growth plate on the convex angulation is another treatment option.
  - **Fetlock angulation** may complicate carpal angulation but usually corrects similarly with time. Varus deformity of the hind fetlocks may be associated with metatarsal curvature and these are very difficult to correct. Remedial hoof trimming and the use of hoof extensions, where appropriate, may help. A decision should be made before 4 weeks as to whether surgical intervention, with periosteal elevation, transaction or distal metacarpal epiphyseal bridging staples or screws and wires, is required.
  - **Tarsal angulation** may involve bilateral valgus deformity or, more commonly valgus deformity of one hock and varus deformity of the other, such foals are often described as 'windswept' behind. The latter may be caused by *in utero* moulding. Most cases respond to time and controlled exercise, remedial hoof trimming and the appropriate use of hoof extensions. Surgical intervention for valgus deformity, with a cortical bone screw placed across the medial malleolar growth plate, is seldom indicated. Varus deformity of hock and fetlock combined presents the most difficult deformity to correct.

## ***Developmental Orthopaedic Disease***

Immature, growing horses are prone to a variety of acquired musculoskeletal disorders, which are commonly grouped into a 'syndrome' called developmental orthopaedic disease (DOD). Abnormalities of epiphyseal and metaphyseal endochondral ossification result in a variety of clinical manifestations:

### **Acquired flexural deformities**

**Club feet**, involving increased angulation and shortening of the dorsal hoof wall and elongation of the heels, usually develop at 2-6 months by acquired flexural deformity of the distal interphalangeal (coffin) joint. The condition often starts with traumatic front heel pain following hard dry conditions, where the foal suddenly walks on its toes with the heels not touching the ground (the so-called 'ballerina' syndrome). If this condition is recognised immediately and the foal given box rest on soft bedding and nonsteroidal anti-inflammatory medication, correction usually occurs quickly and the foal's heels return to weightbearing. If the condition is allowed to persist, a true club foot or feet may result, with the heels lengthening to reach the ground. This requires aggressive remedial farriery, shortening the heels, nonsteroidal anti-inflammatory medication and controlled exercise on a hard level surface, to encourage heel weightbearing. Such cases can require prolonged treatment and prophylactic antigastroduodenal ulcer medication is recommended. Cases that do not respond to remedial farriery require surgical intervention with inferior check ligament desmotomy, an Equilox toe extensions and forced exercise on a hard level surface. Hopping the foal on the affected leg, with the normal leg held flexed, can be helpful post surgical physiotherapy. If all else fails, deep digital tendon flexor tenotomy is a salvage procedure, although such cases are rarely, if ever, capable of becoming athletes.

Acquired flexural deformity of the fetlock joint (joints) can occur from birth to 18 months of age. Mild cases have upright fetlocks while moderate and severe forms show dorsiflexion progressing to 'knuckling over'. As with club feet or 'ballerina syndrome', the key to successful resolution is early diagnosis, nutritional adjustment to reduce energy intake (while maintaining protein, vitamin, mineral and trace element intake), remedial farriery, nonsteroidal anti-inflammatory medication and, in some cases, inferior check ligament desmotomy. Severe cases may require both superior and inferior check ligament desmotomy surgery and are seldom, if ever, subsequently capable of becoming athletes.

### **Acquired angular limb deformities**

Valgus deformity of the carpus and tarsus and varus deformities of the metacarpo/metatarsophalangeal (fetlock) joints are most commonly involved. Deformities arising from the diaphysis of the metacarpus and metatarsus have been reported. Rotational deformity may also be involved. Radiographs will confirm the diagnosis and the centre of the deformity, sometimes called the 'pivot point', can be determined by drawing lines along the axes of the long

bones on either side of the deformity and finding where the lines cross. Radiographs will also identify those cases that have hypoplasia of the cuboidal bones of the carpus or tarsus, which may be congenital rather than acquired deformities. Signs of degenerative joint disease may be found in longer-standing cases.

Many cases of acquired angular limb deformity respond well to conservative therapy with remedial farriery (foot balancing) and controlled exercise on a level surface. Splints or casts are seldom successful and at this stage of a foal's life have a high risk for pressure sore production. If conservative treatment is unsuccessful or if the case is clearly severe enough to warrant it at an earlier stage, surgical intervention may be indicated. This must be attempted before the involved growth plate closes, i.e. before 6 weeks of age for the fetlock joints and before 4-6 months for the carpi and tarsi. Transphyseal bridging of the convex side involves growth retardation whereas periosteal transaction and stripping or just elevation of the concave side involves growth enhancement. Rotational complications often improve as the angulation resolves. Shockwave therapy to the convex side of the growth plate is under study.

### **Phyinitis**

This occurs in the distal metacarpus and metatarsus, distal radius and distal tarsus with peaks of incidence between 4 and 8 months and 1 and 2 years of age. Diagnosis may usually be made on the basis of a grossly enlarged, warm and painful to palpate physis or physes in the presence of varying degrees of lameness. The diagnosis may be confirmed with radiographs that show widening of the cartilage zone, excessive undulation of the growth plate(s) and signs of sclerosis and flaring. When recognised early in the course of the condition, restricted exercise and, where indicated, nonsteroidal anti-inflammatory medication is usually successful in resolving the problem. Cases that have remained undiagnosed for some time and especially those that have developed angular limb deformity as a consequence are more difficult to correct. Bilaterally symmetrical growth plate enlargement and prominence is frequently seen as a characteristic of an individual or in response to a growth spurt and is not a cause for concern in most cases.

### **Osteochondrosis and osteochondrosis dissecans**

These conditions are associated with focal failures of endochondral ossification, which can occur in both the metaphyseal growth plate and the articular/epiphyseal cartilage complex. The aetiology of these conditions is clearly multifactorial and remains incompletely understood. Any joint may be involved, but in Thoroughbred foals and yearlings the stifle and fetlock joints are most commonly affected. Lameness of variable degree and joint effusion are the clinical presentations and the diagnosis is confirmed by radiographic examinations. Joint surface flattening and ulceration are more commonly called osteochondrosis and the term osteochondrosis dissecans (OCD) is usually reserved for lesions with fragmentation.

Conservative treatment, with reduced exercise, nutritional intake reduction with vitamin, mineral and trace element supplementation and nonsteroidal anti-inflammatory medication is often successful in allowing functional repair, following early diagnosis. Surgical intervention, with lesion curettage, usually via arthroscopic techniques, followed by an adequate period of rest and recuperation, may be helpful for cases with large, extensive and fragmenting lesions and those that do not respond to conservative treatment. If the condition is not diagnosed early and conservative treatment applied, degenerative joint disease may follow and this will jeopardise chances for an athletic future.

### **Subchondral bone cysts**

Cystic lesions occur in the subchondral bones of young horse at any site but are seen most commonly in Thoroughbreds in the medial femoral condyle in the stifle joint. It is believed that the aetiology is similar to that of osteochondrosis. Clinical presentation is again varying degrees of lameness and joint effusion. The lesion(s) can be demonstrated by radiographic examinations. Some cases respond to conservative treatment, as described for osteochondrosis and others require curettage via arthroscopic surgery. Corticosteroid injection into the cyst cavity is advocated by some.

### **Juvenile osteoarthritis**

Degenerative joint disease can occur in young immature horses, most commonly involving the proximal interphalangeal (fetlock), intertarsal and tarsometatarsal (hock) joints. This is now believed to be a form of DOD, many cases also showing signs of osteochondrosis. The condition presents with lameness and joint effusion and is diagnosed by radiographic examinations. The condition cannot be cured but only controlled by restricted exercise, nonsteroidal anti-inflammatory and chondroprotective medication, dietary adjustment (reduction while supplementing vitamins, minerals and trace elements).

### **Cervical vertebral malformations**

In some foals and yearlings, cervical vertebral malformations form in association with osteochondrosis-like abnormalities of their vertebral facets, epiphyses and metaphyses, resulting in spinal cord compression and neurological manifestations ('wobbler' syndrome). The diagnosis is confirmed with good quality lateral neck radiographs and, in more unusual cases with dynamic cord compression, with myelography. Cases occasionally recover after early diagnosis followed by prolonged nutritional adjustment (severe energy intake reduction while supplementing vitamins, minerals and trace elements) with box rest. Surgical interventions with cervical vertebral fusion and partial dorsal laminectomy have been suggested, but claims for success vary and this approach remains controversial because of the safety of riding or competing with a horse following such surgery and the implications of inheritance in the pathogenesis of this condition.

## Management of acquired growth problems

These conditions are believed to have multifactorial aetiologies, involving congenital deformity, genetic predisposition, trauma and concussion, rapid growth phase, nutrition and endocrine factors. Therefore, in order to attempt to prevent or reduce the incidence of DOD in young horses it is wise to avoid matings that clearly involve genetic predispositions and to carefully control the nutrition of pregnant mares, weanlings and yearlings to achieve steady, sustained and appropriate growth rates. The use of expertly formulated equine rations designed to provide the correct quantities and proportions of protein, energy, vitamins, minerals and trace elements for age and stage of growth is essential. Plentiful access to *ad libitum* safe natural exercise should be allowed but not forced. Control of exercise levels is facilitated by good stud farm design. Availability of covered yards with soft 'all weather' surface and multiple nursery paddocks with good grass cover is essential. Complete box rest is undesirable for prolonged periods unless necessitated by surgery, as load bearing is thought to be chondroprotective to joint surfaces. Early signs of DOD should be an indication for reduced exercise or complete rest dependent upon an accurate diagnosis of the specific lesion, using appropriate imaging techniques, until resolution, with or without surgical intervention, where appropriate, occurs.

## Further Reading

AUER, J.A. 1988. Current treatment methods for angular limb deformities in foals. *Proc Am Assoc Equine Prac* **34**, pp. 263-282.

BARR, A.R.S. 1995. Management of angular limb deformities in the foal. *Equine Vet Educ* **7**, pp. 75-78.

CURTIS, S.J. 1999. *Farriery – Foal to Racehorse*, Newmarket: Newmarket Farriery Consultancy.

CURTIS, S.J. 2006. Farrier treatment of limb and foot deformities in foals. In: *Lameness and Farriery 2006 Course Notes*, Ontario: Lifelearn Limited.

ELLIS, D.R. 1988. Condition of the hoof wall in young horses and corrective farriery with regard to limb deformities. *Equine Vet Educ* **10**, pp. 155-160.

JEFFCOTT, L.B., DALLIN, G. & WEIR, B.J. (Eds) 1993. Osteochondrosis in the '90s, *Equine Vet J Suppl* **16**.

ROSS, M.W. & DYSON, S.J. 2003. *Diagnosis and Management of Lameness in the Horse*, Philadelphia: W.B. Saunders.

ROSSDALE, P.D., JEFFCOTT, L.B. & FIRTH, E.C. (Eds) 1999. Osteochondrosis and Musculoskeletal Development in the Foal, *Equine Vet J Suppl* **31**.