Claims Five: Why does a broken leg mean the end for a horse?

Senior vets explain why it is often impossible to save an animal after an injury that would hardly ever threaten a human's life

Harbinger's last race in the 2010 King George. Two weeks later, he fractured a cannon bone on the gallops but the injury, happily, was not serious enough to threaten his life. Photograph: Alan Crowhurst/Getty Images

Nothing undermines horse racing than the fact that its heroes may suffer a fatal injury at any moment. It doesn't even need a hurdle or a steeplechase fence; one false step, one misplaced hoof may be all it takes for a bone to break in such a way that the horse cannot be saved.

Racehorses are incredibly tough animals, brave, hardy and durable. At the same time, in the wrong combination of circumstances, they may as well be made of glass.

Among the stoutest of staying chasers I've seen was Young Kenny, who won the Scottish National, the Midlands National and the Becher Chase. Then one day at Haydock, while galloping on flat turf between fences, he suddenly shattered a fetlock joint in one of his hind legs.

When racehorses die in action, accusing fingers are often pointed at the sport. But, although exertion and the possibility of falls increase the risk, the main reason for these thoroughly upsetting moments is that horses often cannot recover from injuries that would pose no threat to humans.

Horses do not just sustain injuries while racing. It can happen when they take part in any kind of sport or leisure activity, or even while they are messing around on their own in a field. However much they are loved and however much money their owner is happy to spend on them, there is no way back from the wrong kind of break.

Cynics assume that money is the issue, but regular followers of the sport know this cannot be true. Neither Barbaro, the hugely popular Kentucky Derby winner, nor Rewilding, who pipped So You Think in a thriller at Royal Ascot this summer, survived their broken legs. Both would have been worth millions if they could have been preserved for a quiet life at stud, but it could not be done.

Why not? In search of explanations, I pitched my naive questions to two well-respected vets at the British Horseracing Authority. Professor Tim Morris is their director of equine science and welfare while Jenny Hall is a vet based in Lambourn who will be veterinary services manager at the Olympics next year. I'm very grateful for their time and patience.

1) Most humans recover easily from broken legs. Why can't horses?

"The problem is, because their bones have become lighter," Hall told me. "They're very strong, to carry their weight, yet they're light, for them to be able to go fast. So, unfortunately, sometimes, when they break, they just shatter."

When that happens, it is not possible to repair the bone, and not just because it is now in lots of little pieces that won't heal together. Another issue is what Hall called "plastic deformation", meaning that the bone bends before it breaks and it is the bent shape that is preserved in the pieces. Even if it were possible to put the pieces back together, you would end up with a madly bent bone.

Hall continued: "When you look at their lower limbs, which is where a high incidence of these injuries are, there's very little soft tissue covering the bone. So unfortunately,

often, if there's a fracture, it may well be that the bone penetrates the skin, which turns it into an open fracture.

"Even in people, that makes it a much harder situation to get good healing. So you can imagine, with a horse, no matter how quickly a jockey pulls it up, it's hard for the skin not to get damaged and also for the blood supply to get damaged."

"And living tissue needs blood," Morris added. "If there was a fracture there, there's all the tendons, the nerves and the blood vessels that a sharp edge of bone could cut. So, down the rest of the leg, there's no blood supply to it, so the tissue may die, let alone having enough blood supply to heal."

Even if there were a remote possibility that the bone might heal, it may not be a good idea to wait and see, because of the complication of laminitis.

2) Laminitis?

The horse's hoof is attached to its leg by interdigitating laminae, fibrous tissue. These are strong enough to support the horse's weight when that burden of 500kg or so is shared across four legs. But when a horse breaks one of those legs and tries to support itself constantly on the other three, the increased burden creates serious problems for the laminae at the base of those legs.

Morris: "Instead of the 500kg being distributed around four hooves and being able to take it, you are giving a third extra force to the remaining hooves and that comes under pressure. The problem is ... you're within a hard outer box [the hoof], so [the laminae] get inflamed, which is incredibly painful."

Hall: "And it affects the blood supply. It's a pressure necrosis. Like a bed sore."

Morris says that laminitis can be treated with painkillers, along with other drugs to deal with "the failure of the bloody supply, because there's so much inflammation ... But the problem is, you can get a vicious circle of more pain, more inflammation, building on itself very, very quickly in a severe case."

So any owner considering whether their horse may recover from a broken leg has to consider the pain of laminitis that they may well have to go through. And then, as Hall points out, there is also the question of "the quality of life that they will have at the end of it.

"If you have a limb amputation, you're still going to have a good quality of life, aren't you? But how do you judge a horse's quality of life? Will it have the ability to be turned out at liberty in the paddock, will it need long-term pain medication? Because you or I can have a new hip or new knee if we need one. That's not possible [for horses].

"It isn't that some of these fractures couldn't be prepared. It's that, even if you do that and put the horse through all that, where's your end-point? You've got to be able to get him back to having four functional legs."

Hall refers to the euthanasia guidelines published by the American Association of Equine Practitioners, which include these "guidelines to assist in making humane decisions regarding euthanasia of horses":

• A horse should not have to endure continuous or unmanageable pain from a condition that is chronic and incurable.

• A horse should not have to endure a medical or surgical condition that has a hopeless chance of survival.

• A horse should not have to remain alive if it has an unmanageable medical condition that renders it a hazard to itself or its handlers.

• A horse should not have to receive continuous analgesic medication for the relief of pain for the rest of its life.

• A horse should not have to endure a lifetime of continuous individual box stall confinement for prevention or relief of unmanageable pain or suffering.

3) Can't we do more to help them? Support them with slings while the bone heals? Replace the bone artificially?

Even if the horse could be persuaded to lie still and let the bone recover, there are other problems. Its weight, in particular, works against it. "They get pressure sores if they're lying down all the time, things that are difficult to manage in people, let alone in a 500kg horse," says Hall.

Are pressure sores the reason we don't just knock them out and leave them on their side until they recover? "No," said Hall. "They'd get pneumonia for starters."

Morris: "You've probably heard quite often, particularly with elderly people going into hospital for a hip-bone fracture which keeps them in there and then they get secondary pneumonia because they're lying down. When you're lying in your wrong position, the fluids that accumulate in the lung don't get cleared so well and that's the point of infection."

Surely, I suggest, you could support the horse in a sling, sparing it the risk of laminitis while its leg heals. "In the old days, they used to try. And it used to go horribly wrong,"

Morris said.

"The horse version of bed sores is sling sores. They will be rubbing and also [the horse] won't be used to it. And you're talking weeks, not days, and that is one of the biggest welfare issues."

Hall: "Again, they're heavy. So, to take a meaningful amount of the horse's weight, you're then compressing its intestinal tract and everything. Temperamentally, as well, you can't explain to a horse what you're doing. You can't say, look, mate, stay there quietly, it'll all be fine, you're only going to be there for three weeks, don't worry about it."

What about replacing the bone with something synthetic? "Human hospitals store either synthetic packing materials or irradiated human bone to be a scaffold," Morris said. "Again, it's the problem that it's invariably weight-bearing in the horse. You might use it if you've got a simple fracture, to pack a gap, but they're not structural at all."

Hall: "And bone is a living tissue, it's forever turning over. You do need a biological structure, really, for the long term."

4) Horses are sometimes put down very quickly on the racecourse. Is it possible to make a proper assessment so quickly?

Hall: "Because of the way the emergency services are deployed on the racecourse, the first opinion, the first veterinary surgeon to attend the horse, will be there very quickly because he will have been following the race [in a vehicle on the inside of the course].

"His colleague, because there are always multiple veterinarians on duty to cover a race meeting, paid for by the racecourses, will be there very quickly. For the horse to have a full clinical assessment and second opinion can be done very quickly.

"The horses that have fatal injuries, they have very extreme injuries. There's no possible misunderstanding of those. The horse will not have a supporting limb. The limb that he's injured will no longer be able to take any weight."

Racecourses, Hall said, are very efficient at transporting any connections from the grandstand to the injured horse, "so everyone connected with that horse will have been able to assess the situation and understand the severity of the situation".

"If the horse can travel comfortably, safely, off the racecourse, then the horse will go back in the horse ambulance and be taken to the veterinary treatment area, where time can be taken to evaluate the horse further and decide whether he needs to go off to

hospital. [Those present can] make a proper, informed decision as to what exactly the injury is and how realistic it is for the horse's long-term future and welfare, whether repair is a good option."

In contrast to the fear behind my question, that critical decisions are being made very quickly, Hall and Morris cited a recent case at Sandown where some of those in the crowd apparently expressed concern that it took a long time for the vet to put a horse down after it had broken a limb in front of the stands.

In fact, they pointed out, the vet had given the horse a painkilling injection as soon as he arrived on the scene, as is standard practice. The horse was in no pain and there was time to make a thorough examination and reach an unhurried decision.

5) Can we hope for fewer fatalities in future?

Morris refers to a graph on the BHA's website that shows the number of equine fatalities each year, expressed as a percentage of total runners. There are ups and downs but the graph shows a gradual downward trend over the past 15 years.

Morris attributes this decline, at least in part, to improved technology. "It's changed completely. Better anaesthetics, better pain relief, better technology to hoist horses, stronger implants, better understanding of bone biology and how it heals, better diagnosis. It's the whole package of knowledge and then people do more, then they get better at it and you're in a virtuous circle.

"We think we've done the easy things in terms of ground, obstacles, veterinary treatment. To get it down to the next jump down, what we're doing now is, what are the complex risk factors?

"Since 2000, in a systematic way, we've been collecting every single death or injury and details of it. That's about a million runners over 10 years, so that's big enough to do stats and we're looking at our entire racing database to see what causes and associations are.

"That's being done with the University of Glasgow, by the epidemiology research group. So we're doing a systematic review of the horse that has a fatality or an injury, what factors are different from the horse that doesn't? That's going to be finished, I think, in 2013."

Once the risk factors have been identified, Morris, Hall and their colleagues can consider possible interventions that could minimise those risks. Across the whole of British horse racing, no one is doing more worthwhile work.