

Disease Du Jour Episode 58 Dr. Alison Gardner on Equine Suturing Tips

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Kim Brown: Welcome to this episode of Disease Du Jour on the topic of Equine Suturing Tips with Allison Gardner DVM. Gardner is also a Diplomat in the American College of Veterinary Surgeons, large animal, and a Diplomat in American College of Veterinary Emergency and Critical Care, large animal. She's an assistant professor of clinical equine surgery in the Department of Veterinary Clinical Sciences at The Ohio State University.

I'm your host Kim Brown, publisher of EquiManagement.

The Disease Du Jour podcast is brought to you in 2021 by Merck Animal Health. Welcome Dr. Gardner.

Dr. Alison Gardner: Thanks Kim. Thanks so much for having me on the podcast.

Kim Brown: I'm really excited about this. We just had a Disease Du Jour podcast on emergency medicine in the field, so this is a great follow-up as the top two emergency calls are for colics and lacerations.

So, let's just jump right in. What are the top considerations when you're addressing an injury? To know whether it needs to suturing or not.

Dr. Alison Gardner: Sure. So, I think I should preface this by saying, I work at Ohio State and I'm in the hospital, which means I'm in the ivory tower.

I get things sent to me, and I've got a small army of people to help me. So take that with what you will, and that I get to probably suture up a lot more because I've got the help. I've got the ability to have lights in an area and clean things out thoroughly.

But we do see a lot of lacerations that haven't been seen by vets out in the field, just because our referring vets are so busy.

So, if they're already seeing, like Kim said, that colic, which is the other prevalent emergency, and don't have time to see the laceration, they'll just send it right into the hospital because there's a chance we can get it done faster.

And we do try to suture most of our lacerations standing. And then, the ones that don't have underlying joint involvement or any bony abnormalities, I often give the owners the option of taking it home that night if they're comfortable with keeping it bandaged, and their veterinarian can take out sutures in a bit.

So, I'll just start prefacing that. In regard to wounds that I choose to suture, a lot of it depends on two things.

One—how long that wound has been there. And two—what underlying structures could be involved. And all of us know those wounds, where the owner swears up and down it just happened and you go out and there's plenty of granulation tissue in the wound. So, you know it's been there for at least three to five days.

Those ones are really hard to suture, and they're also a little dirtier. So even if I choose to suture those, a lot of times I'll do delayed closure of those. I'll clean them up that first night, debride them, and then put a bandage on and decide if I can suture them up the next day.

Another thing that may delay my closure is how much edema is in the wound.

Distal limb wounds are fairly infamous for having very little skin to close together. There's just no soft tissue there. And sometimes when there's edema in the area, it just makes it impossible to suture the edges together.

We had a horse even two weeks ago that I thought we could get it done. And it just had too much tension across the wound.

So, in those instances, I'll put a compression bandage on usually with a 7.2% hypertonic saline wet-to-dry bandage over the wound. That helps with drying out some of the edema and also some of the particulate, some may be contaminating the wound. And get to a suture at the next day after removing the compression bandage.

I don't like keeping those hypertonic bandages on longer than 24 hours because the saline can macerate the tissues. So, I want to get to those the next day, but I found them really helpful in that wound I mentioned two weeks ago was easily sutured up the next after compression bandaging.

And then I also mentioned underlying structures. So, with lacerations, especially the distal limb, there's a big concern for joint sepsis or joint contamination. And those are the ones where if there's joint contamination, those are the ones we'll anesthetize in the hospital, ton lavage out the joint. And I will suture up those wounds if it's contamination of the joint, meaning acute and we're able to get a good lavage through, or I'll leave them open. If that joint is very, very contaminated—high cell count or there's particulates in the area, or it's a little bit more chronic, meaning that horse may need to have another lavage under anesthesia.

So those are, those are my considerations for suturing. But generally here, if it's an acute wound and I can get those edges together, I prefer to suture them.

And the one other thing before we get into the rest of decision-making for suturing that I'll mention, is I tell the students, even if you can suture it up, there's so much tension across these planes of tissue in horses that in all likelihood, the best it's going to look is that 30 minutes after you suture it up.

So, I always warn owners. There's a chance of some dehiscence five to seven days after we suture that wound together. And so they're pleasantly surprised if there's not, but then they don't blame the vet if that distal limb wound loses some of its sutures. So, I'll preface it with that.

Kim Brown: Okay. And what considerations come into play when you're in the field and you're getting a wound ready to be sutured.

Dr. Alison Gardner: Yeah. So, I think there's the stuff an owner can do before the vet gets there, and then there's stuff the vet can do.

So firstly, the stuff an owner can do if the wound is bleeding heavily, and again, talking about distal limb wounds, there is a risk of a horse losing a large amount of blood if it lacerates either the medial or lateral palmar/plantar vessels. So, if it's just an issue of the horse is bleeding a lot, and it's going to be an hour before the vet can arrive, then the owner can place a tourniquet.

So, research has shown that there's a little risk to long-term damage of a limb in any species if a tourniquet is placed on for an hour or less. So, in an emergency situation, tourniquets are okay.

I would not leave a tourniquet on overnight. And I know everybody listening as a veterinarian knows that, but, in the acute stages with a lot of blood, I think that that may save a horse. But it's rare to have that kind of bleeding.

Other things owners can do, in distal limb wounds we see a lot of wounds with high-tensile wire. Horses get their legs stuck in things. And they think that it's a better idea to try to amputate themselves than just stand quietly and wait for somebody to free them. That's probably the most common wound we see. And then we see a lot of heel bulb lacerations where horses have literally stomped dirt into their wound and in those cases, then, cleaning out a wound with a garden hose...we'll often even start with that in the hospital.

The risks to that, is that the water from a garden hose, it's hypotonic fluid. So, it will cause some cellular swelling. But if you've got manure particulates in the wound, then that's probably the easiest way to remove gross contamination.

And then if an owner's competent in bandaging, they can certainly bandage up the limb either for transport or then just wait for the vet to get there.

And then when the vet gets there, I think the biggest thing is assess underlying structures. We could do a whole 'nother podcast on how to assess underlying structures. So, we will, Kim, if you want to get into that more, we can, but rule out joint or bony involvement. If there's no joint or bony involvement, then I do clip all my wounds. You can put some water-

soluble lube in the wound to keep hair from sliding down into it, but, it'll let you see wound margins better. It's, I think, just keeps the area cleaner, and then also allows you to see if there's any other wounds that may be more difficult to see under hair.

And then I'll usually clean the wound with a chlorhexidine scrub. And then if it's a large wound, then I'll just saline rinse that chlorhex off rather than use alcohol.

And then the next thing I do before suturing is I always debride my wound margins. And there's several different types or methods of debridement. My favorite, which is the kindest to healthy tissues, is sharp debridement.

So, after applying a local block to that area, either through a nerve block or our a line block, I'll take a scalpel blade and just gently debride, just maybe one tissue layer around from those wound edges, to allow for appropriate healing and removal of contamination.

A lot of times, if there's a big fascial plane that's exposed, you'll actually see dirt ground into that fascial plane. And I'll use the scalpel blade a 10 blade or even a 22, a big guy to take off that very top layer of tissue to remove the contamination along the way.

Kim Brown: Okay. Some good tips on that one.

So, let's look at some of the specifics that you deal with. And you've talked about leg wounds and some of the problems that you have there. What steps do you take and what are you looking to do and how do you handle leg wounds?

Dr. Alison Gardner: Sure. And I'll, you know, I've touched the most on leg wounds. Horses like to run into things at high speeds and lacerate themselves all over.

But I mentioned leg wounds because I think they're the most frustrating. There's really important structures—such as vessels, nerves and joints—right underneath distal limbs, and there's just not much skin or soft tissue to hold things together. So, when we're talking about risk of exuberant granulation tissue, we're usually talking about leg wounds.

So, poor blood supply, just not much soft tissue.

So, I try to preserve as much tissue in these areas as possible. And then I try to suture these up after ruling out underlying synovial structure with tension-relieving principles. And even if the skin flap—cause a lot of times we're dealing with a flap with these high-tensile wires—even if the skin flap looks like it might potentially die, I'll still suture that to the parent skin for two reasons.

One, I've been pleasantly surprised. Sometimes it decides to regain life or just that the tip of it dies off. And two, a lot of these horses expose their cannon bone. And any exposed cannon bone has a risk of sequestration development long down the road, which certainly prolonged that animal's convalescence.

Kim Brown: In the leg wound, are you using a bandage or a not bandage, or does it depend on the location?

Dr. Alison Gardner: I'm always a bandager on leg wounds. That's a good question. Yeah. To protect the stitches, horses also live in their manure, so it gets dirty. And then, the more you reduce movement, the higher chance that wound is going to heal together more cosmetically.

So, not only am I a bandager if say the cannon bone is exposed. But sometimes we'll put splints on these horses to reduce movement, especially if it's one of those distal, cannon bone lacerations down by the dorsum of the fetlock, the fetlock can really move that area a lot and contribute to dehiscence.

And then there's a couple of times I'll even apply a bandage cast or with healable lacerations a foot cast.

Now, with those horses that come in here, we'll either tell the owner to keep the horse in the hospital so that we can keep an eye on those casts or give them strict instructions on stall rest only. They've got to monitor that cast at least twice a day for any signs of slippage or cast sores, and then keep a close eye on an animal if it's got an immobilized distal limb.

Kim Brown: And let's go up from there to the chest and body. Because sometimes like, bandaging, man, trying to keep a bandage on some of those areas is tough

Dr. Alison Gardner: Oh, I agree. And then, I'm going to change my tune a little bit.

So, neck wounds, chest wounds, abdominal wounds. That's when we look like heroes, because the blood supply is just so much better. So, these wounds often look worse because there's just a lot of soft tissue involved. And then these are the ones where horses run into things at high speed.

So, ones I can think of, are a horse that took a five by eight-centimeter piece of skin and muscle out of her neck by running into a gooseneck trailer. And that healed very well within a couple of months.

Horses that try to squeeze through doorways. They can't fit, and a lot of us see point of the shoulder lacerations.

And then of course the chest and abdomen wounds, just like in the distal limb, rule out underlying structure involvement.

So, on the neck, you're probably going to realize if the jugular carotid is lacerated, but the esophagus is in that area as well. And then, chest wounds, rule out a pneumothorax. Horses do have an incomplete mediastinum, so if there's a pneumothorax on one side, there'll generally be one on the other. And there's a chance that that horse might be in respiratory distress from a chest wound.

And then abdominal wounds. Sometimes we'll do an abdominocentesis just to ensure that there was no penetrating wound to that area.

So, if ... probably of those that the vet can absolutely save the horse's life on the farm if they identify a pneumothorax on the farm. Because in those, in those situations, I'd recommend

referral if there's thoracic involvement or abdominal involvement. But if there's thoracic involvement, then the vet can relieve the pneumothorax and then also apply Saran wrap around the horse to keep it from sucking any more air into the chest cavity.

Otherwise, my decisions for suturing these up are similar, but you've just got more skin to work with. There's less tension in these areas. And so there's a chance that they might heal better with those.

And then a lot of these I'll leave unbandaged, unless the horse self-mutilates, which they sometimes will. They'll turn around and bite at your sutures. So, in those cases, things like slinkies or blankets might protect the wound. But I'm with you, Kim, especially point of the shoulders or elbows. They're really, really difficult to bandage up.

Kim Brown: I remember a filly we had that ran into a T post and did the whole L-shaped cut and the vet tried to put a bandage on. And he's like, this will not stay, but it makes you feel better. The sutures are in there. Good. There's plenty of tissue. If the bandage comes off, it comes off. But I think he was just trying to cover it because it was so big, so we wouldn't panic over it. And this was when I was a kid, so it made a big impact on me.

Dr. Alison Gardner: Yeah, I think that they weren't made for this, but slinkies for horse shows to keep braids down have been really helpful for some of those pectoral and neck wounds. There's also some liquid bandaging materials such as AlluSpray that I love. It keeps wound edges together, or from water penetrating—liquid penetrating—in those first couple of days until the wound provides a seal through healing. Which is helpful.

Kim Brown: Okay. And let's move on up the body to heads. You talked about leg wounds bleed a lot. You can scare a horse owner to death with a head wound.

Dr. Alison Gardner: I totally agree. Head wounds are, they're a vet's best friend because of the blood supply, but they are dramatic looking because of how much the head bleeds.

And this is across all species. Right? We talked about this in people, too. Head wounds just bleed a lot.

Bleeding means better healing. And so head wounds heal beautifully and quickly.

Often there's still a risk of underlying structure involvement. Sinuses are probably the thing to worry about the most, as well as the orbit of the eye.

So, check for any eye involvement and adequate air flow through both nostrils. And also, I would say, realize that if this is an acute wound that you're looking at, and there's a chance of more edema, there might be some risk of upper airway obstruction if the wound is bad enough to involve sinuses/nasal passages.

So, just be cognizant of airflow and if that animal needs a tracheostomy.

Otherwise, they heal up really nicely if there's no fractures involved. Even if there are fractures involved, they often heal quite well. And these ones, a lot of times you can get by with just some skin staples, and they just heal up really nicely.

Make sure they can eat, make sure that they can breathe okay.

And then, to your point, Kim, this is what I tell a lot of owners. It looks like a lot of blood when these horses are bleeding from wounds, but we don't even start to think about need for blood transfusions—either IV fluids or blood transfusions—until an animal's last 20% or greater of blood volume. Which in a 1,000-pound or 500-kilogram horse comes out to about eight to 10 liters of blood. So, what looks like a lot of blood to an owner is not too severe for a horse. If that's a fair thing to say,

Kim Brown: So, for vets in the field, and you had mentioned the staples, you'd mentioned suturing, all these different parts of the body. If you're a vet in the field, how many different types of needles and sutures and so forth, what are kind of your go-tos?

Dr. Alison Gardner: Yeah, absolutely. So staples, I'll only use if there's absolutely no tension across a wound, which is why I usually save them for head wounds. If you can just pinch that skin together without any tension, then staples can do it.

But if there's any tension at all, you'll have to do suture. For me, breaking it down again into those categories of leg wound, body wound, head wound. Leg wounds., there's not too much soft tissue in that area. So, most of the time you're suturing skin. So just one layer, and we're really fighting against Halstead principles when we're suturing leg wounds together. Because on one side you want the smallest amount of foreign material in a wound for better cosmesis, but a larger gauge suture is going to be better for tension relief. So usually I'll use tension-relieving patterns with a larger gauge suture, say an ought monofilament. And then I'll fill in with simple interrupted with a smaller gauge suture.

Now I prefer non-absorbable suture because it means that in 10 to 14 days, another veterinarian is going to be looking at this wound, taking out those sutures. And I think it's more cosmetic to remove the foreign material rather than let it fall out on its own. But I'm also dealing with—in Ohio—pretty nice animals.

So, if you're in a population where you're just dealing with some yahoo weanlings as your patient that you're not seeing a lot, I could see the argument for absorbable sutures in that area. Or if you're worried about clients that won't have you back out to remove those sutures.

Moving up to the trunk, same principles with the skin sutures, but there's a higher likelihood that you can get a deeper layer in there. Muscle doesn't hold suture very well. So usually as long as it's a clean wound, I'll switch to a braided absorbable suture in a slightly bigger suture size, say an ought or so.

Kim Brown: And, anything else on the body wounds? You said that muscle doesn't hold a suture very well. What are you doing if you're trying to keep that, you know, if there is a tear in it or something to heal?

Dr. Alison Gardner: I guess I can clarify that by saying muscle's never going to be the holding layer of your repair.

So, what you're trying to do when you suture muscles together is get them in the same zip code for them to heal. But that holding layer is still going to be your skin. And there's still going to be some tension with that skin, even in the abdomen.

So, strategies for wounds when there's tension, we'll use the tension-relieving patterns of vertical mattresses, horizontal mattresses—near far, far near.

And if that still doesn't cut it, I'll add some stents, either buttons or I'll cut up on an extension set [and thread suture through small pieces so they may act as stents and don't cut through the skin], knowing that stents reduce the cosmesis of wound healing.

And then the last thing I'll go to, if there's still a lot of tension, are releasing incisions where I make small incisions into the skin around that wound to basically increase the surface area of that skin around the wound for pretension relief, and also that can help with drainage as well.

Kim Brown: Okay. And with heads?

Dr. Alison Gardner: With heads, I'm trying to think of ... there are of course, times in head wounds where there's a lot of tension, but less so than on distal limbs.

I think with heads, the bigger concerns are involvement of underlying structures, the flat bones of the face—especially over the sinus—often fracture with head wounds, especially with the way horses get them running into each other, running into posts.

So, if there's involvement of those sinus bones, then we can elevate those. We can improve cosmesis.

If the horse is breathing adequately, and the owner just absolutely doesn't want to refer the horse in for a sinus fracture or anything like that, it'll probably heal up okay.

The other thing to worry about in the sinuses are dentition down the road. So, it may be worth checking out those teeth at one point.

But really, I think the big thing to worry about is ocular involvement. How that eye is doing. Staining the eye, if necessary, to rule out any corneal ulceration.

People often worry about head wounds and the cranium. Probably two months ago, I would have told you I've never seen a horse with a head wound ... or a laceration—I've seen plenty with head wounds that involve the cranium and the brain—but two months ago, we had a horse come here that had a fracture that involved her cranium.

And so, that one we lavaged, did debridement, did wound principals, sutured it up, and she actually did okay.

So, of course consider the cranium, but the horse brain is relatively small to the rest of its face, and I've seen a lot more sinus and a lot more ocular involvement than central nervous involvement with head lacerations, at least.

Kim Brown: Well, is there anything else that you can think of—maybe tips or tricks that you teach your students or that you have for veterinarians in the field—when you're dealing with a laceration that needs to be sutured?

Dr. Alison Gardner: I think the one thing we haven't mentioned is drains. So, there's been a couple lacerations where I've regretted *not* putting in a drain.

I don't think there's a laceration where I've regretted putting in that drain.

So, I generally use Penrose drains. If at all possible, you want to exit that drain in an area separate from the wound. It will decrease cosmesis in the healing of that wound. So, I'll usually make a stab incision adjacent to the distal aspect of the wound, or if there's a pocket within that pocket distal to the wound and have the drain exit through there.

And then the drain has to be pulled three to five days after you place it. Otherwise, it acts as a conduit for bacteria to crawl up.

So, the other suggestion I would make is use a separate suture or suture pattern, or somehow mark the suture you used to suture in that drain, especially if your associate's going to be the one pulling the drain in a couple of days, and you've got a day off so that you know which suture to cut to pull that drain and not disturb your skin sutures.

Kim Brown: Good point. And while we're talking about students, and I know you work with students there, what are the most common things that students need to learn about skin injuries that require suturing?

Dr. Alison Gardner: Yeah. I think just suture handling and getting comfortable with the tension-relieving patterns.

And then, in Ohio, we've got a good amount of students that do mixed animals, so they do small animals and then they do large animals. So, I think, students are pleasantly surprised with how much we can do standing in the equine field. It's faster, and it's often safer for the horse to not have to put this animal under anesthesia.

And it's certainly cheaper for the owner.

So, a good working knowledge of nerve blocks if it's a distal limb wound, and performing a good line block if it's a head or an abdominal wound.

If a horse is particularly twitchy, we'll use a butterfly catheter to administer the local block through that butterfly catheter without tubing on the end so that the horse, when it pulls away, it's not pulling your needle out.

So, I'll reinforce just those ideas with students, as well as just the normal time points of the healing cascade.

So, going back full circle to when we first started about when do you suture, knowing that granulation tissue doesn't march in until day three to five after a wound. So, if you see granulation tissue, then you know that it's more chronic.

And, really, I emphasize with the students—protect themselves by telling the owner the wound's going to look worse five to seven days after suturing. Because as my students, as they graduate—as they're going out—I don't want an owner to say, 'well, this young vet didn't suture my horse up appropriately because the distal limb wound dehiscence seven days later; they just do that.

Kim Brown: Yeah. Good points. Okay. Well, Thank you very much Dr. Gardner, for joining us today for this episode of Disease Du Jour. Some great tips in this, so we really appreciate it.

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