**InterNICHE**

**DVM: Training the Animal Doctor**

**Surgery and the SynDaver Canine**

Summary clip

Official transcription

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summary clip

Dr. Galina Hayes (00.05)

My name is Dr. Galina Hayes. I'm an assistant professor at Cornell University. I work in the soft tissue surgery section, and my responsibilities include providing service to clients and animals coming to the hospital, either on an elective or emergency basis, requiring soft tissue surgical procedures; as well as training the students, both the third and final year students, in the theory and practice of surgery.

(00.32)

Veterinarians are expected to know and do a lot and have a grasp of a very wide range of skills, which in my opinion, may not be entirely realistic to expect them to accomplish within four years.

(00.45)

Their exposure to hands-on surgical training may be limited to just a few weeks in their final year of their DVM training. And within those final weeks there may not be that many opportunities for direct mentorship.

(01.01)

In the veterinary world, we leave and are expected to be surgically competent at the end of just our basic DVM training.

(01.10)

And while I don't expect that to change anytime soon, I think we can change the way we deliver that training through the DVM programme to try and make sure that the skill set that our graduates are equipped with is a little bit closer to what they're expected to have.

Dr. Brad Case (01.26)

Within the sophomore surgery course, the course that I co-ordinate, I have tried to focus on clinically important, practical, concepts, techniques, knowledge. What is going to make a difference for my patient? For example, GI surgery: very, very commonly performed. Dogs eat rocks and toys, and they plug up their guts and then they need to have surgery.

(01.55)

If you don't do the surgery correctly, there is a good chance they're not going to survive, because they're going to leak the contents of their bowel into their abdomen.

(02.04)

So I'll spend a lot of time talking to them about how do you properly assess the bowel, to make sure that you've got healthy tissue that you're bringing together, and how do you suture it together correctly? Because you can suture it together incorrectly, spend a lot of time doing it, feel good, and have a failure.

(02.20)

I do believe that if you understand the tissue properties and the pathophysiology of the disease, and you have basic surgical skills - and common sense - you can apply those basic skills that you learn from your courses, and maybe a clinical spay, to other procedures.

Dr. Galina Hayes (02.39)

In my opinion, surgery is a very... It's heavy on hand skills. Yeah? And you can talk about it in a PowerPoint all you want, but nothing really replaces having someone stood across from you adjusting how you're holding instruments, adjusting your body position, adjusting your tissue handling. And it's those skills that translate into patient benefit and patient safety.

Dr. David Danielson (03.02)

So here at SynDaver, what we are looking for is to fulfil curriculum need. The University of Florida specifically saw the need for an alternative to cadaver surgery. It was not working. And live surgery, too, was something that they did not want to persist with. They had specific curriculum tasks, surgeries that they wanted the students to be able to do that we needed to fulfil in the model.

Dr. Brad Case (03.29)

We set up an interview meeting with them, we drove down to Tampa one day, we pitched an idea to them about using their technologies that they had already, you know, developed and had been marketing and applying on the human side, for dogs.

(03.43)

From a practical perspective, the vascular anatomy. So how big is the vessel? Where is the vessel? Is it there or not? Does it connect to the right places? With the texture of the organs, are they… are they stiff, too stiff? Are they too friable or too soft?

(04.02)

And now, we've spent a lot of time on them, and they're beautiful.

(04.05)

The liver is very, very close to the texture, the feel, the compressive abilities, qualities, it's vascularised - we have a little bit vascularised - of a dog liver. We've got quite an impressive high fidelity canine now.

Dr. David Danielson (04.25)

So the first thing that I'm proud of, and like, is the fact that it does have a very realistic airway. The tongue, as well as the internal aspects of the glottis and all, allows intubation. Also the face, I tried to give it kind of kind eyes, and you feel a bit of empathy for the canine as you use it.

(04.45)

Second, we do have the ability to put IV in both front legs, in the cephalic vein. To that, we can also draw blood from those areas. We have... The jugular vein is modifiable, so it allows central line catheterisation, but you can draw blood from both sides. Also there's a pulse.

(05.03)

You can create anaesthetic scenarios where the learning experience can be beyond just what's being done within the dog.

(05.12)

In the real world, you've got to worry about their breathing, you’ve got to worry about their blood pressure, their heart rate. And the dog, because of our ability to have it kind of change through a tablet, we can alter heart rate, we can put them in ventricular tachycardia, we can modulate them.

(05.30)

Looking into the chest cavity, there is a heart, as well as you can see both lungs and the bifurcation of the trachea. Since this can be intubated and hooked to a respirator, the lungs will expand and you can, of course, adjust that to enhance the scenario.

Dr. Chris Sakezles (05.46)

Conceptually what we do is very simple. You know, we start out with a live tissue study. So we'll actually get a sample of a tissue, we'll run it through a battery of tests that can be mechanical, physical, they can be things like puncture resistance, co-efficient of friction, abrasion resistance, tensile modulus - you know, stretching, pushing, pulling, and measuring the kind of loads you get in response.

(06.11)

Then using a knowledge of material science, you can come up with candidate materials to try to mimic all of those things. And you might have 12 different properties that you're trying to mimic. And through a process of experimentation and designed experiments, you can come up with, a material that would be considered a validated mimic for skeletal muscle, for example.

(06.33)

And you know, once you've done that a hundred times, you've got materials that you can build an entire body with.

Dr. Galina Hayes (06.39)

Certainly I think one of the greatest strengths of SynDaver use is in its ability to provide a very high fidelity environment for the practice of abdominal surgery in dogs. For me, the intestine in the SynDaver is the closest to live animal dog intestine that I've been able to find.

(07.03)

It has very similar layering, it holds suture in a very similar manner. It handles the same. You can perform the same procedures in it. You're working down within a cavity. It holds staples in the same way that live dog intestine would.

(07.18)

We've really tried to focus on two target audiences, if you like. The general practitioners and ER doctors.

(07.26)

Probably the highest... highest risk procedures that surgeons in that setting perform are intestinal procedures. And there's an intentional emphasis on intestinal procedures for those reasons.

(07.41)

So the students are assigned in pairs to a cadaver unit and they each alternate performing different components of the procedure.

(07.50)

And then our focus during the lab is to teach them gentle tissue handling, efficiency in their use of instruments, how to maintain a flow of productivity through the procedure and not get bogged down in unnecessary snarls. And safety: how to maintain a sterile field, how to manipulate tissue so they can maintain good visualisation.

(08.15)

And it's those core skills which they can then take on and apply to pretty much any other procedure that they try and do in the future, but which are impossible to teach in a didactic setting.

Dr. David Danielson (08.26)

This leads us to the bladder. And, of course, the bladder specifically has a few pathologies itself. There are, in this case, three stones that are palpable within it. This, again, guides the surgeon to perceive there to be a problem.

(08.41)

There's stones, though he doesn't know how many, so he must open the bladder, remove the stones, but thoroughly pass a catheter, clearing it, and then passing it again.

*Cystotomy lab*

Dr. Daniel Lopez (08.51)

You can either create, and flip your blade upside down, and just like the *linea [alba]*, do the reverse stab incision up, and then extend with a pair of scissors; or you can paint down with the blade until you're in the lumen and then extend with scissors. But I think either of those are fair.

Student 1 (09.06)

Ready.

Student 2 (09.18)

All right. Stones.

Dr. Daniel Lopez (09.20)

When you guys are suturing the bladder, please ensure, again, you go serosa to mucosa, mucosa to serosa, to ensure that you engage the submucosa.

(09.30)

Use your needle here to grab the loop, pull up, right? That's going to tension the previous sutures that you placed, and then pull it down. And as you pull it down, you're going to be able to put it in the position that you want the suture to lay.

(09.46)

And then once you're there, try not to move the knot, and then it's another additional five throws here, so three total square knots.

(09.55)

And I like the way you're flattening your hands. Rock your hand and your needle driver in your hand as you go. And so as you rock it, it's going to tighten each side now.

Dr. David Danielson (10.05)

Going further in, we would exteriorise the intestine. And again, as a good surgeon, you are thorough in your exploration, and will get the feel of the intestine and determine that there are certain irregularities here that you don't want to miss.

(10.22)

So it feels... kind of like a dice. How would I deal with this particular thing? Well, you would do an enterotomy. So at this point, you would cut, remove that foreign material, sew it up.

(10.34)

But there's another issue here too. There's a pathology, an area of irregularity, perhaps damage that was done by the dice. So this would guide us to consider this area an area where I would do an anastomosis.

*Enterotomy, resection and anastomosis lab*

Dr. Daniel Lopez (10.47)

What is going to be the preservation of your blood supply? And this is the hardest portion to figure out. I think with the resection and anastomosis, twofold, is, where to cut and what blood supply to save. And so again, if we're pretending that we need to remove all the sutures of the enterotomy, what arcades need to go and what arcades need to stay? We have great blood supply from this jejunal arcade -

Student 3 (11.09)

OK

Dr. Daniel Lopez (10.10)

...to supply this from this end.

Dr. Daniel Lopez (11.17)

You want to actually pretend like you're placing a suture -

Student 1 (11.20)

Right

Dr. Daniel Lopez (11.21)

...almost at the base of the intestine and ligating and ligating, so that it's not bleeding. And actually it's like a very prominent artery that'll spurt at you. And so they can be a pain.

(11.29)

So I find trying to create an environment for success before you cut the intestine is important

Dr. Galina Hayes (11.36)

So I think surgery is very much an iterative, cumulative acquisition of skills. And when you begin surgery, you don't know how to hold a pair of needle drivers, and you don't know how to tie a knot. I mean, it's very appropriate that you learn to do that on a silicone pad.

(11.52)

And then the next challenge after that becomes how to adjust that suture tension appropriately to the tissue that it's being placed in, and then a silicone pad no longer works, and you need something that simulates tissue.

(12.04)

And then the next challenge after that becomes, how do I do those things while working down and inside with another piece of bowel trying to flop on top of a piece of bowel I'm working on - and then to learn that skill set, you need an actual full dog.

(12.18)

And then the final part of it becomes, how do I learn to do that with a patient that's breathing and moving and bleeding, where I feel the pressure of emotional responsibility to the patient and the owner to perform optimally, and for that, you then need a live patient.

(12.35)

And you would never think that your entire surgical training could be accomplished on a silicone pad, but you would never begin with the live patient.

(12.43)

For any skill set, there is a learning curve that exists. When you're low on that learning curve, you will have an error rate, and what is important is that that error rate not be transmitted to the patient. Yeah?

(12.56)

Learning in an environment... Just in the same way that airline pilots learn in simulators, surgeons need that same opportunity.

Dr. David Danielson (13.04)

So we've designed this so that you have repeatability. The organs that are interfaced are replaceable.

(13.11)

Going further back, you can appreciate the stomach and the omentum, which is draping all of the intestine. This is a female dog, it's also designed as a spay trainer. We do have the reproductive tract represented. It also has the suspensory ligaments, the broad ligament. It has the horns ovary.

(13.36)

You would have to approach the abdomen, go in and break down that suspensory ligament, ligate the ovarian vasculature, and then come down, break it down and remove this as you would a common spay.

Dr. Galina Hayes (13.51)

I think it's important to recognise that all surgeons, no matter how experienced and how proficient, will run into situations where either they've made an error, or just the nature of the procedure that they're working on, means that some untoward event begins to occur.

(14.09)

Typically that would be active haemorrhage, it might be loss of control of a ligature, it might be an insecure knot, it might be inadvertently traumatising crucial tissue.

(14.22)

And it's important, in my opinion, that students experience that emotion for the first time in a setting where there is not a live patient at risk, and where there is someone available to mentor them through how specifically to address that issue.

(14.42)

And so that's a great opportunity to give them their first introduction to that emotion and how to handle it.

(14.48)

To perform competently under stress.

*Dropped pedicle lab*

Dr. Daniel Lopez (14.50)

We're going to set up a clinical scenario where one of their pedicles, secondary to a spay that they've been doing, is now bleeding. The patient is starting to decompensate, their anaesthesiologist is panicking. And we’ll set up a high-pressure situation for them to try and figure out where the bleeding is and to then stop that bleeding.

(15.13)

Because your blood... your heart rate has now come up to 160 beats per minute.

Student 3 (15.18)

Oh no! There must be something bleeding. OK, I'm going to check here... Oh, there it is!

Dr. Daniel Lopez (15.27)

And your patient's heart rate is 180 beats per minute.

Student 3 (15.30)

And this stupid haemostat is not working!

Dr. Daniel Lopez (15.33)

We're up to 200 beats per minute.

Student 3 (15.39)

OK, bleeding is under control.

Dr. Daniel Lopez (15.40)

And our heart rate is coming back down slowly here.

(15.46)

So once you're done, cut that, and release the haemostat, and see if it's bleeding.

Student 3 (15.54)

Not bleeding! We saved him. We saved him!

Dr. Daniel Lopez (16.01)

And so I would say that was really good. You guys identified the major bleeding pedicle. The only thing that I would say, instead of going directly in with a haemostat, right, start with the Balfours [retractors], right? Get in, improve your visualisation, right?

[Interviewer] (16.12)

How did you feel as the crisis developed?

Christine Leung (16.15)

I mean, yeah, I do feel like the machine really hyped it up, made me think something was really dying. But yeah, it was well controlled really quickly. And we were able to visualise everything very quickly. So that was good.

Dr. Galina Hayes (16.26)

I think really the… SynDaver lab accomplishes multiple facets, or multiple goals. One is to try and remove students' natural fear of surgery. It's very hard to behave with good competency and calmness when you feel stressed or afraid.

(16.48)

The second is to encourage an enthusiasm for the procedures and for surgery in general, and encourage them in the idea that your surgical training is an iterative process - you acquire a skill, you practice it, you discover that you need another skill, you go learn it, you practice that, you constantly improve and that's a lifelong career commitment.

(17.13)

And the third is to give them a basic skill set which will translate into any surgical procedure that they undertake.

Dr. Chris Sakezles (17.22)

Well, the most difficult thing about getting something like the synthetic canine into practice is the cost. We have a number of ways we can help universities and different places acquire them. It's an investment, it's definitely an investment.

(17.35)

You know, the argument that we make, and the argument that's 100% true, is that you get superior training. You know, if you really want to be in the business of graduating students that are going to be able to practice and perform surgery, you're doing them a disservice if you don't invest in this sort of platform.

Dr. Galina Hayes (17.55)

For me, performing that kind of surgical training on a live animal which is being used solely for the purposes of training and is then euthanised, is unacceptable for a large number of reasons - not the least of which that I believe it inculcates in the beginning surgeon, the idea that the patient is disposable. And I would not be ever willing to participate in a lab like that.

Dr. Brad Case (18.24)

The only use of live animals in the training of surgery at the University of Florida is in our small animal hospital where we have board certified surgeons who are doing clinical surgeries with our professional veterinary students, either assisting or watching.

(18.40)

I am not a believer in terminal surgery. They don't do it in human surgical training, and I don't - it's my opinion - that it's not something that we need to do in veterinary. And I've always felt that way.

Dr. David Danielson (18.50)

You can learn good medicine and be ethical at the same time. And I believe in the long run, that will translate to being a better, more empathic doctor too, because you don't carry that burden.

(19.03)

When I graduated, I did have to experience a terminal surgery. In hindsight, I don't feel that that really taught me anything that helped me in the future. In fact, I still carry that scar.

(19.16)

It all circles back to that core necessity, on several fronts. One, to preserve our own emotional and ethical… kind of… compass; as well as to allow us to be better clinicians, to give our clients better service, better medicine.

(19.37)

I love caring for animals, I see myself more as a paediatrician than a veterinarian. I see veterinary medicine and the practice of veterinary medicine, more about preserving the bond. I feel a great weight of responsibility that the connection between that client and that patient, I mean, that is... that's just pure love.

(20.01)

People are appreciating this unconditional love that these companions give.

(20.06)

It is really... It's a joy for me, actually.

END (20.30)