Techniques for Using Biologic Mesh in Hernia Repair: Clinical Experience With VERITAS Collagen Matrix

Designed for use when synthetic mesh is contraindicated or otherwise undesirable, biologic mesh provides surgeons with the ability to achieve a sturdy repair without undue risk for infection or the long-term complications often associated with synthetic products.1 Despite some benefits over synthetic meshes, some biologic meshes possess features—such as a high elastin content or conversely, crosslinked rigidity1—that make them a less optimal choice for specific procedures. Introduced in 2001, VERITAS Collagen Matrix (Synovis) is a non-crosslinked biologic mesh comprised of bovine pericardium.2,3 VERITAS is designed to provide surgeons an additional option that aims to further reduce operative and postoperative complications related to biologic mesh use.

VERITAS is intended for use in reconstruction of the pelvic floor excluding transvaginal pelvic organ prolapse, the repair of rectal prolapse excluding rectocele, and for use as an implant for the surgical repair of soft tissue deficiencies: abdominal and thoracic wall repair, muscle flap reinforcement and repair of hernias (eg, diaphragmatic, femoral, incisional, inguinal, lumbar, paracolostomy, scrotal, umbilical).2 Preclinical data showed VERITAS resulted in more favorable remodeling than other meshes, including another similarly non-crosslinked mesh.4,5 VERITAS displays high remodeling characteristics, low foreign body response, and good deposition of the extracellular matrix (ECM).4 Its pliability may make VERITAS easier to pass through a trocar, handle, and suture, according to Craig G. Chang, MD, FACS, program director of Bariatric Surgery in the DeTar Healthcare System in Victoria, Texas.

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VERITAS for Hiatal Hernia Repair

Dr. Chang performs approximately 4 sleeve gastrectomies per week. When performing these procedures, he noted that he also examines for the presence of hiatal hernias in need of repair. Considering that obese patients who have undergone sleeve gastrectomy may be affected by the presence of hiatal hernias and postoperative gastroesophageal reflux disease, Dr. Chang repairs hiatal hernias at the time of the bariatric procedure.

“I’m not sure many of my colleagues recognize the importance of fixing hiatal hernias as part of sleeve gastrectomy,” Dr. Chang said. “What we tell patients is that the sleeve is a reflux-producing operation because food backs up into that upper pouch. We’ve long known that the sleeve tends to cause reflux, but we’re finding that if we aggressively treat their hiatal hernias, the incidence of reflux tends to be pretty low.”

As the level of stress to the area of paraesophageal hiatal hernias can be high, sutures-only primary repair of these types of hernias may not be sufficient to prevent disruption. In one study, there was a statistically significant reduction in recurrence when the repair was reinforced with mesh (9% of the mesh repair group) compared with sutures-only repair (24% of the primary repair group) (P=0.04). Nevertheless, the presence of a foreign material carries its own risks, according to Dr. Chang. “If you use prosthetic mesh like a polytetrafluoroethylene or polypropylene mesh, it tends to erode into the stomach or the esophagus, or both. This is why most surgeons tend to use a biologic mesh at the hiatus,” he said.

Currently, there is little long-term data to recommend the use of one biologic mesh over another for hiatal hernia repair. A recent multicenter, randomized trial of a biologic mesh (SURGISIS, Cook) to reinforce the primary repair of paraesophageal hernia found a recurrence rate of 54% compared with 59% for the control group.

In the absence of evidence-based recommendations, there are other qualities Dr. Chang weighed and considered before forming a preference for VERITAS Collagen Matrix. “SURGISIS tended to be a little harder to handle because you have to soak it. If you don’t soak it thoroughly enough, it is more difficult to sew through,” he said. “FLEXHD (Ethicon) is pretty thick. That’s not necessarily bad, but it can be more difficult to make it conform to all the irregular contours of the diaphragm and the hiatus, where there are many areas where the mesh needs to conform. So, I’ve gravitated toward a slightly thinner biologic mesh.”

Techniques for Effective Repair

In patients undergoing sleeve gastrectomy who have hiatal hernias, Dr. Chang first turns his attention to the hernia repair to avoid subjecting a newly created sleeve and staple lines to the pulling and tugging of the esophagus inherent to hiatal hernia repair.

“First, I try to mobilize as much of the esophagus as I can,” he said. “I go through the hiatus and about half-way up to the clavicles, if I can get that far, and I try to bring as much of the stomach and esophagus down into the abdominal cavity as I can.” Then, he closes the crura of the diaphragm posterior to the esophagus with a figure-eight suture using a braided polyester suture, and reinforces the repair with a mesh onlay of VERITAS 6x8 cm in which he has formed a keyhole defect to allow space for the esophagus to pass through (Figure 1).

“I place that piece of VERITAS up against the diaphragm so that it is overlaying the repair posteriorly, then suture the mesh to the diaphragm with 0 VICRYL [Ethicon] interrupted sutures, using an absorbable suture that will hold the mesh in place until it adheres.” Animal data has demonstrated positive remodeling—meaning both mesh degradation and generation of new tissue—with VERITAS at 1 month postoperatively. This can present pros and cons for hiatal hernia repair. “When it incorporates and basically dissolves, it’s not there to erode into the esophagus obviously. But as it disappears, it’s not there to support the repair any more either,” he said. “Having said that, in the cases where I’ve taken patients back for another surgery such as a cholecystectomy, I’ve seen some evidence of the mesh.”

Dr. Chang commented, “We’re seeing pretty good symptomatic relief of reflux with sleeve gastrectomy patients, in part because we’re mitigating one of the risk factors for reflux, which is obesity. When you address obesity with sleeve gastrectomy and repair the hiatal hernia, the reflux tends to get better.”

VERITAS for Incisional and Parastomal Hernia Repairs

For Eric G. Weiss, MD, FACS, FASCRS, FACG, director of the Education Center, DIO and chairman of Graduate Medical Education, and associate residency program director in the Department of Colorectal Surgery at Cleveland Clinic Florida in Weston, Florida, finding the right biologic mesh for abdominal wall reconstruction started with surgeons and industry coming to a better understanding of the overall abilities of mesh.

Figure 1. Hiatal hernia repair using VERITAS Collagen Matrix.
Images courtesy of Craig G. Chang, MD, FACS.

* Biologic mesh products are classified by the FDA as a Medical Device.
For example, although biologic mesh offers obvious advantages in a contaminated or clean-contaminated field, they cannot bridge a fascial defect and achieve remodeling of the fascia at the edges of the mesh, according to Dr. Weiss.

With the capacities of biologic meshes clarified, however, it became apparent that some materials underperformed in the area of abdominal wall reconstruction. “We found that ALLODERM (LifeCell) became more stretchy as it remodeled,” Dr. Weiss said. “Although the mesh incorporated well and was replaced by host tissue, that tissue would bulge. That was not a true hernia, but patients were unhappy with the cosmetic result, and so were we.”

Other meshes Dr. Weiss tried needed soaking or rehydrating. Some required the surgeon to determine which side should face up or down. “These seem like relatively minor issues, but when you’re in the operating room, the less you have to think about the products you use on a daily basis, the easier procedures are.”

Due to its bovine pericardium composition, Dr. Weiss found that VERITAS Collagen Matrix had minimal stretch and more closely resembled native fascia than did the dermal products he used. He said that “now, we find VERITAS is easy to use and handles well from a surgical perspective, and all the nursing staff has to do is retrieve the size you need, open the package, and you’re good to go.

“We’ve been very happy with the outcomes in the sense that we don’t get any bulging; the mesh seems to incorporate well, and we haven’t gotten many seromas,” he added. “Also, VERITAS tends to be less expensive than some of the dermal products and even some of the other competitive products.”

**Techniques for Effective Repair**

One of Dr. Weiss’s two most common uses for VERITAS is in a nonbridging abdominal construction when a patient has a large incisional hernia and possibly, an enterocutaneous fistula (Figure 2). “In these cases, we achieve primary abdominal wall closure with a component separation, and then place the mesh either in a sublay position or, more commonly, as an onlay on top of the component separation,” he explained. “We had found in the past that, over time, people started developing bulges—almost hernias—in locations away from the repair. So, we started buttressing the entire repair with a biologic mesh. In this approach, we buttress the lateral aspect of the component separation where we slid the rectus medially, so there is no fascia overlying the external oblique.”

The second common use Dr. Weiss has for VERITAS is in the repair of parastomal hernias. “In this situation, we most commonly perform the repair laparoscopically, and use the Sugarbaker technique with VERITAS, but we also have performed these repairs in an open manner,” he said.

**Features of VERITAS and the Process**

Meshas made from bovine pericardium are composed of dense, regular connective tissue, and in the case of VERITAS, harvested from cattle less than 30 months of age. Additionally, VERITAS is non-crosslinked. Although proponents of crosslinked meshes argue that the process of crosslinking results in a superior repair due to the longer lasting presence of the mesh, this may not in fact be the case. A comparison of 4 crosslinked and non-crosslinked meshes composed of different materials found that although there were differences between the products in terms of ECM deposition, cellular infiltration, scaffold degradation, and neovascularization, crosslinking had no significant effect on the strength of the repair.

“All biologic meshes become degraded over time, and manufacturers of crosslinked products often say crosslinkage slows down the degradation process. But animal data shows that whether products are crosslinked or not, at 12 months, the strength of the abdominal wall is equivalent,” Dr. Weiss observed. “Furthermore, in some non-crosslinked products, specifically VERITAS, the fact that they are not crosslinked allows for some remodeling, such as vascular ingrowth, and the laying down of collagen and the ECM, to occur earlier.”

Dr. Weiss uses VERITAS for abdominal wall reconstruction because “bovine pericardium is most similar to native fascia, and VERITAS is easy to use,” he said. “It handles well, it sutures well, and there is no subjectivity in terms of how you place it. Also, it does not need to be stretched, comes in multiple sizes, and can be used right out of the package.”

**VERITAS for Abdominal Wall And Breast Reconstruction**

Charles K. Lee, MD, FACS, chief of Plastic Surgery at St. Mary’s Medical Center, San Francisco and assistant clinical professor of Plastic & Reconstructive Surgery at the University of California, San Francisco, turned to VERITAS as soon as the product became available to him about 5 years ago.
Dr. Lee used VERITAS Collagen Matrix in extensive abdominal wall reconstruction and breast reconstruction in the hopes that it would meet demands not satisfied by other biologic meshes. “I’ve used ALLODERM, FLEXHD, ALLOMAX™ [Davol], and PERMACOL™ [Covidien]. The problems I had with these were poor incorporation, infections, and difficulty with handling,” Dr. Lee recalled. “Sometimes they are not very easy to use and they require a long hydration time.” Dr. Lee wanted a mesh that he could use right out of the package, that did not require rehydration, and that would act like the fascia itself, the very tissue he sought to replace. “I also wanted to make sure that it would actually revascularize,” he said. “And VERITAS was the only biologic mesh available that was made of pericardial tissue.”

Techniques for Effective Repair

Abdominal wall reconstruction typically involves the removal of skin and fat from the lower abdomen as well as removal of a portion of or the entire abdominal muscle in some cases. In complex abdominal wall repair, to close a larger hernia, Dr. Lee uses VERITAS as an augmentation in component separation, usually as an underlay, but also occasionally as an overlay. “For the underlay, I use polydioxanone ‘U’ stitches size 1-0 through the fascia,” he explained. “Then, I create a primary fascial closure over the VERITAS.” Depending on the tension of the suture line, Dr. Lee might place an overlay atop the repair, using interrupted polydioxanone stitches or running sutures.

In breast reconstruction, Dr. Lee uses VERITAS as a fascial sling for the tissue expander or implant. “I use it in the lower pole, as a fascial sling below the pectoralis muscle,” he explained. “For this, I use a 2-0 polydioxanone suture from the lower border of the pectoralis down to the intra-mammary crease.”

Since switching to VERITAS, Dr. Lee has been pleased with the product and the clinical outcomes it has provided for his patients. “I’ve had great success with it in both abdominal wall and breast surgeries. I’ve discovered that it revascularizes very quickly. It’s very strong and acts like fascia,” he said.

Dr. Lee noted that the processing of VERITAS makes it particularly useful for the type of complex reconstructive procedures he performs. “It is non-crosslinked. One of the things we’ve discovered in the use of biologic meshes is that crosslinking may inhibit their ability to revascularize. Crosslinking causes the biologic mesh to act more like a foreign substance, not crosslinking allows it to act more like true biologic material. I think VERITAS, not being crosslinked, but still able to maintain its strong structure, offers some advantages.”

Conclusion

Due to its risk for infection—which was reported as high as 30.9% in one study4—surgeons have avoided synthetic mesh for certain procedures. One alternative has been the use of biologic mesh, specifically bovine pericardium. Surgeons have used this material extensively for years, and a history of well-tolerated biocompatibility has been shown.4,5

“We have many choices now with biologic meshes, and I think that certain biologic meshes have advantages over others,” Dr. Lee said. “Surgeons looking for a biologic product that acts more like fascia, reincorporates very quickly, and is easy to handle, should consider VERITAS.”

For hiatal hernia repair, Dr. Chang is quite pleased with VERITAS to date, but with the paucity of data on the use of biologic meshes in hiatal hernia repair, he feels strongly that this is an area in which more clinical trials, studies, etc. should be conducted. “This is a bit of a philosophical statement, but community surgeons like myself can contribute a lot of case volume and work with our academic colleagues to study some of these issues,” Dr. Chang said. “With a high long-term failure rate, we need to do better than that and establish best practices. I think the responsibility is on us as general surgeons to do that.”

References