Onlay with Adhesive Use Compared with Sublay Mesh Placement in Ventral Hernia Repair: Was Chevrel Right? An Americas Hernia Society Quality Collaborative Analysis

Ivy N Haskins, MD, Guy R Voeller, MD, FACS, Nathaniel F Stoikes, MD, FACS, David L Webb, MD, FACS, Robert G Chandler, MD, FACS, Sharon Phillips, MSPH, FACS, Benjamin K Poulose, MD, MPH, FACS, Michael J Rosen, MD, FACS

BACKGROUND: The use of mesh during ventral hernia repair (VHR) is a well-accepted concept. However, the ideal location of mesh placement remains strongly debated. Although VHR with onlay mesh placement has historically been associated with a high rate of wound events, this surgical approach is technically less challenging than VHR with sublay mesh placement. The purpose of this study was to compare 30-day wound events after onlay mesh placement with adhesive fixation vs those after sublay mesh placement using the Americas Hernia Society Quality Collaborative database.

STUDY DESIGN: All patients undergoing elective, open VHR with synthetic mesh placement from January 2013 through January 2016 were identified within the Americas Hernia Society Quality Collaborative. Only patients with clean wounds were included. Patients were divided into 2 groups: onlay mesh placement with the use of adhesive and sublay mesh placement. The association of mesh location with 30-day wound events was investigated using a matched analysis.

RESULTS: A total of 1,854 patients met inclusion criteria; 1,761 (95.0%) underwent sublay mesh placement and 93 (5.0%) underwent onlay mesh placement with the use of adhesive. A 2:1 sublay to onlay matched analysis was performed based on factors previously shown to influence wound events after VHR. After matching, both groups had a lower mean Ventral Hernia Working Group grade and fewer associated comorbidities. There was no statistically significant difference between the sublay and onlay groups with respect to 30-day surgical site infections (2.9% vs 5.5%; $p = 0.30$), surgical site occurrences (15.2% vs 7.7%; $p = 0.08$), or surgical site occurrences requiring procedural intervention (8.2% vs 5.5%; $p = 0.42$).

CONCLUSIONS: Ventral hernia repair with onlay mesh placement is a safe alternative to VHR with sublay mesh placement in low-risk patients. Additional studies are needed to determine the long-term mesh outcomes and recurrence rates in both of these groups. (J Am Coll Surg 2017; 224:962–970. © 2017 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Disclosure Information: Nothing to disclose.

Disclosures outside the scope of this work: Dr Stoikes is a paid consultant for Bard, holds provisional and utility patents on Somavac and Vaccuus, and owns stock in Somavac. Dr Poulose is a consultant for Ariste Medical and Pfizer and received grants from Bard and Davol. Dr Rosen is paid as a speaker for Bard and WL Gore, and is paid in stock as a board member of Ariste Medical.

Support: Drs Poulose and Rosen are employed by the Americas Hernia Society Quality Collaborative.

Received December 14, 2016; Revised January 11, 2017; Accepted January 17, 2017.

From the Comprehensive Hernia Center, Digestive Disease and Surgical Institute, The Cleveland Clinic Foundation, Cleveland, OH (Haskins, Phillips, Rosen), Section of Minimally Invasive Surgery, University of Tennessee Health Science Center, Memphis (Voeller, Stoikes, Webb, Chandler), Department of Biostatistics (Phillips), and The Vanderbilt Hernia Center, Department of Surgery (Poulose), Vanderbilt University Medical Center, Nashville, TN.

Correspondence address: Michael J Rosen, MD, FACS, Comprehensive Hernia Center, Digestive Disease and Surgery Institute, The Cleveland Clinic Foundation, 9500 Euclid Ave, A-100, Cleveland, OH 44195. email: rosenm@ccf.org

http://dx.doi.org/10.1016/j.jamcollsurg.2017.01.048
ISSN 1072-7515/17

Abbreviations and Acronyms

AHSQC = Americas Hernia Society Quality Collaborative
OG = onlay group
SG = sublay group
SSI = surgical site infection
SSO = surgical site occurrence
VHR = ventral hernia repair
VHWG = Ventral Hernia Working Group

Ventral hernia repair (VHR) is one of the most commonly performed general surgery procedures in the US.[1-4] Although the use of mesh during VHR is well accepted, the ideal location of mesh placement remains strongly debated.[5-7] When deciding the ideal location for mesh placement, factors such as early wound morbidity, long-term mesh outcomes, durability of the hernia repair, and technical challenges to achieve the repair, must be considered.

Common locations for mesh placement during VHR include the premuscular, retromuscular, preperitoneal, and intraperitoneal positions.[5] The premuscular position is often referred to as the onlay position and was first described by Chevrel in 1979.[8] The key tenets of the onlay VHR include reconstruction of the linea alba, followed by broad fixation of mesh to the anterior rectus fascia with suture and fibrin glue reinforcement at the site of midline closure.[6,8,9] This procedure requires creation of lipocutaneous flaps and division of the periumbilical perforator vessels, which have historically been associated with a high rate of postoperative wound events.[10] The retromuscular, preperitoneal, and intraperitoneal positions can be referred to broadly as sublay repairs.[9,11-13]

Like many debates in hernia surgery, there are pros and cons to both types of VHR. Although the literature has supporting arguments for each approach, these studies are often limited by inadequate sample size, selection bias, surgeon bias, and inability to control for key hernia operative details and patient characteristics. This paucity of high-level data has led the choice of mesh location to reside primarily on the preference of the surgeon rather than grounded in clinical outcomes.[14] This type of practice limits our ability to determine the ideal location for mesh placement. The purpose of this study was to investigate differences in early wound morbidity after onlay with adhesive use vs sublay VHR in a well-matched group using data from the Americas Hernia Society Quality Collaborative (AHSQC).

METHODS

Patient identification

All patients undergoing open, elective VHR with synthetic mesh placement from January 2013 through January 2016 with CDC wound class 1 were identified within the AHSQC. Patients included in this analysis underwent either an onlay or sublay VHR. Those patients that had a laparoscopic VHR, inlay mesh placement, or CDC wound class 2, 3, or 4 were excluded from this analysis.

Data source

The AHSQC is a nationwide registry designed to improve the value of hernia care using real-time continuous quality-improvement principles. At the time of this study, the AHSQC had data available from more than 150 surgeons who practice in a variety of clinical settings, including academic, community, and academic-affiliated hospitals. The registry component of the AHSQC is composed of predetermined standardized definitions for data collection in the preoperative, intraoperative, and 30-day postoperative phases of hernia care. Details on the AHSQC and registry structure, governance, and data assurance process have been reported previously.[15]

Onlay group

The onlay group (OG) included patients who underwent VHR with mesh placed anterior to the rectus fascia with subcutaneous flaps developed to expose this space. For the purposes of this study, only patients that underwent an onlay repair with fibrin sealant as originally described by Chevrel were included in this analysis.[6,8,9] Patients undergoing onlay VHR with mesh fixation using staples, suture, or tack fixation without a sealant were excluded from the final analysis.

Sublay group

The sublay group (SG) included patients who underwent VHR with mesh placement below the rectus muscle in either the retromuscular, preperitoneal, or intraperitoneal position. All patients undergoing sublay VHR with adhesive, staples, suture, tacks, or any combination thereof were eligible for study inclusion.

Classification of wound events

Wound events were divided into surgical site infection (SSI), surgical site occurrence (SSO), and SSO requiring procedural intervention. Surgical site occurrence includes any SSI, as well as wound cellulitis, nonhealing incisional wound, fascial disruption, skin or soft tissue ischemia,