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Non-crosslinked porcine acellular dermal matrix in pediatric abdominal wall reconstruction: a case series

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ABSTRACT

Introduction: The use of biologic mesh where native tissue deficiencies limit reconstructive options has been well documented in the adult population, with increasing use to address the special requirements of complex abdominal wall reconstruction. There is, however, little documented evidence as to the safety and efficacy of these products in the pediatric population.

Methods: This retrospective case series details 5 pediatric cases of complicated abdominal hernia repair with Strattice®, a non-crosslinked porcine acellular dermal matrix. Outcomes measured include recurrence, infection, seroma formation, symptomatic bulging, and need for mesh removal. Defect size, mesh size, and history of prior abdominal operations and infection were also recorded.

Results: Patients received Strattice® with an average area of 132.2 (24–250) cm^2 and primary closure was achieved over a mesh underlay in three (60%) patients, while the remaining required a bridging approach secondary to lateral defects. Complications included suture extrusion, requiring suture removal, hernia recurrence without bulge, noted incidentally, and seroma formation, requiring placement of drains.

Discussion/conclusions: In conclusion, the use of porcine ADM in pediatric patients appears to be potentially safe and efficacious in the context of complex abdominal wall defects, including those with substantial contamination. Our small series builds on previous reports in this difficult patient population. Although additional study, with larger subject pools, would assist in solidifying the observations seen in this and other series, initial findings suggest that porcine ADM is a valuable tool in the treatment of these complex patients.

Level of evidence: Case series: Treatment study, Level IV

The use of permanent, absorbable or biologic mesh where native tissue deficiencies limit reconstructive options has been well documented in the adult population in breast, thoracic, abdominal wall, and pelvic reconstruction [1]. Biologic meshes have been increasingly used to address the special requirements of complex abdominal wall reconstruction in patients with a history of multiple intraabdominal procedures, ostomies, and infected synthetic meshes. Unlike their synthetic analogues, biological meshes, such as acellular dermal matrices (ADM), allow for cellular and vascular ingrowth, increasing their resistance to infection and even allowing for granulation if exposed [2–4]. There is, however, less published as to the safety and efficacy of these products in the pediatric patient, with the attendant consideration of patient growth.

1. Methods

After IRB approval, a retrospective chart review was performed of all pediatric patients who underwent abdominal wall reconstruction by the senior author, a plastic surgeon, (S.I.) in conjunction with the pediatric surgery team between 2009 and 2012, at Texas Children's Hospital. All repairs were performed with Strattice® (LifeCell Corp., Bridgewater, NJ) mesh placed intraperitoneal in a true or bridging underlay fashion [5,6]. Outcomes were measured in terms of recurrence, infection, seroma formation, symptomatic bulging, and need for mesh removal. Recurrence was determined either clinically or by incidental finding, on imaging obtained for unrelated indications, in follow-up.

1.1. Operative technique

Following resection, in the case of neoplasm, or removal of previously placed mesh and lysis of adhesions, for recurrent hernias, the abdominal fascia was freed to allow for approximately 2–3 cm of mesh-fascial overlap. If the fascial defect could be decreased by mobilization of one or both rectus complexes toward the midline, a component separation (CS) was performed in a minimally invasive fashion as described by Butler et al. [5–10]. Before placement, the mesh was rinsed with normal saline and submerged in an antibacterial bath of vancomycin 1 g, gentamicin 80 mg and bacitracin 50,000 units in 100 cm^3 of normal saline. The mesh was then trimmed to match the size of the defect without tension and then secured to the fascia using interrupted O Prolene® horizontal mattress sutures (Ethicon, USA). Where primary fascial

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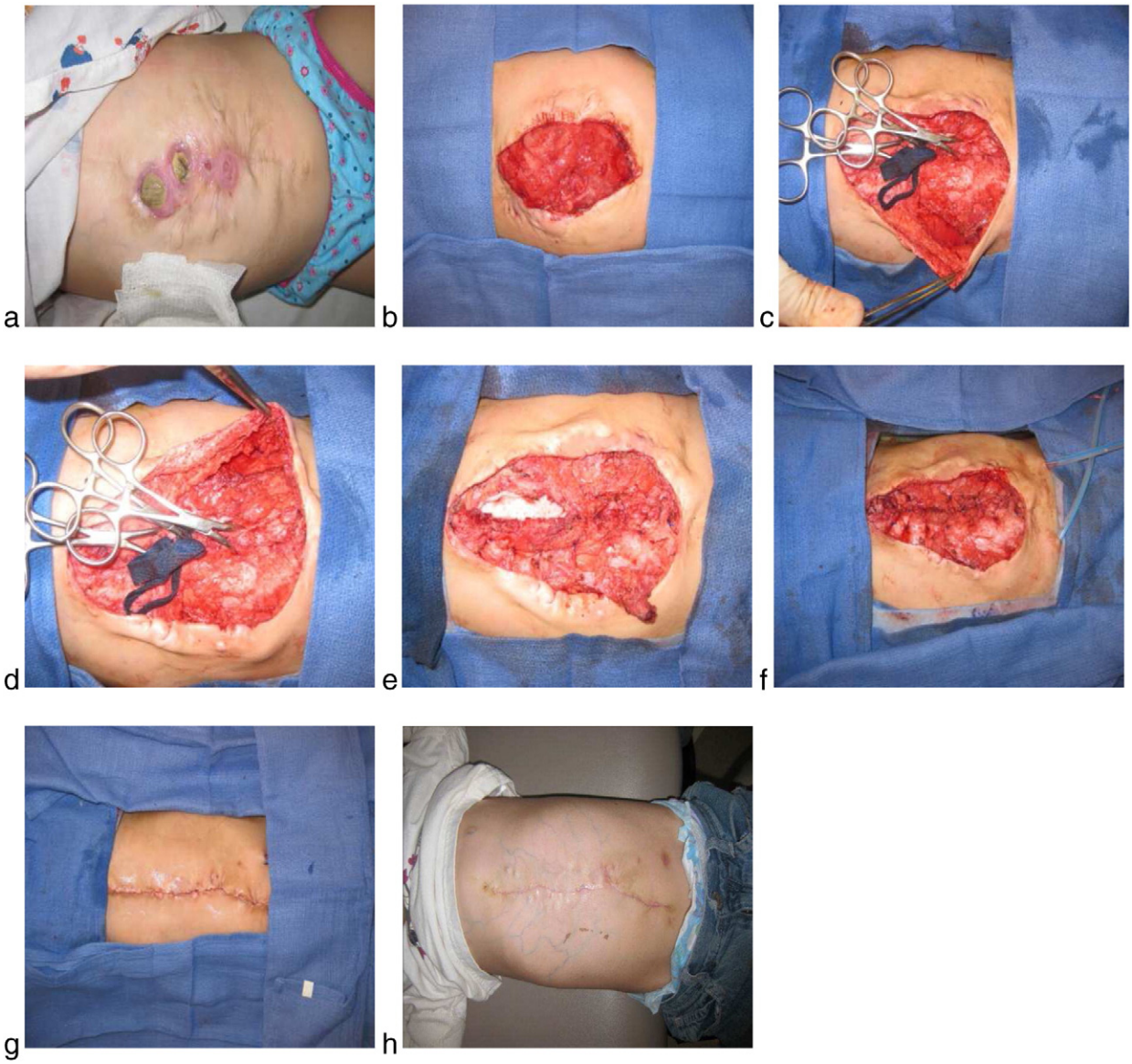

Fig. 1. Case 1: abdominal reconstruction of gastroschisis, complicated by infection and failure of previous repairs a. Repair breakdown; b. mesh removal and debridement; c. right component separation; d. left component separation; e. Strattice® inlay; f. primary fascial closure; g. wound closure; h. 5-month follow-up without evidence of hernia recurrence. Impending extrusion of permanent fascial sutures is evidence, however.

closure was possible, the mesh was inset as a true intraperitoneal underlay with the overlying fascia repaired with figure-of-eight O Prolene® sutures (Fig. 1). Otherwise, a bridging intraperitoneal underlay technique was used, tacking the fascial edge to the mesh as far medially as possible.

Subsequently, Scarpa's fascia was closed using 3-O PDS® Suture (Ethicon, USA) over two 15Fr round Blake drains. Postoperatively the patients wore an abdominal binder for 3–4 weeks. Care was taken to minimize activity leading to increased intraabdominal pressure and postoperative antibiotics (IV clindamycin, until tolerating PO) were administered until drains were removed (output $<20\ cm^3$/day), on average at 2 weeks.

1.2. Case 1

A 3.7-year-old female presented with a large ventral hernia. She had a history of nine previous abdominal surgeries to address gastrochisis, with herniation of over half the liver and both the small and large bowel initially. Procedures included Bentec silo bag (Bentec Medical, Woodland, CA) placement with multiple revisions and Alloderm® with wound VAC coverage of exposed viscera. Attempts at abdominal wall reconstruction with porcine submucosal small intestine extracellular matrix (Surgisis Gold®; Cook Biotech Inc., West Lafayette, IN) and Gore-Tex 4 and 6 months prior, respectively, were both complicated by Pseudomonal infection, without fistulization, requiring removal. The patient underwent repair with an 8×3 cm Strattice® true underlay with bilateral CS. She did well postoperatively and was discharged post-op day 7. Because of poor nutrition, several of her Prolene® sutures extruded, necessitating incision and drainage and suture removal at 6 months post-op. As of last follow-up, 40 months post-op, hernia recurrence was not noted.

1.3. Case 2

A 13.2-year-old male presented with prolonged open abdomen, more than 13 months. He had developed multiple enterocutaneous fistula after tumor necrosis of his Burkitt's lymphoma resulted in intestinal perforation. He underwent abdominal reconstruction with a 25×10 cm Strattice® true underlay with bilateral CS after an extensive lysis of adhesions, small bowel resection $\times 5$, and diverting loop jejunostomy by