Restoring Abdominal Wall Integrity in Contaminated Tissue-Deficient Wounds Using Autologous Fascia Grafts

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In April of 1998, this *Journal* published the article "Restoring Abdominal Wall Integrity in Contaminated Tissue-Deficient Wounds using Autologous Fascia Grafts."[1] The purpose of that study was to examine the clinical utility of autologous fascia lata grafts for abdominal wall reconstruction where local tissue is inadequate and where prosthetic material is contraindicated. Autologous fascial grafts had already been shown to become vascularized and to resist infection compared with synthetic mesh in a rabbit model.[2] Thirty-two patients underwent abdominal reconstructions using autologous fascia lata grafts during a 9-year period. The majority were patients with ventral hernias who had exposed synthetic mesh, enteric fistulas, or wound contamination. The mean follow-up period was 27 months (range, 3 to 106 months), with a hernia recurrence rate of 9 percent (three patients).

Based on the early success with the above series of patients, the indications for using autologous fascia lata have now widened to include not only those patients in whom prosthetic material is absolutely contraindicated but also those patients who may be at increased risk for infections. The majority of patients in this new category are solid-organ transplant recipients who are chronically immunosuppressed. Those immunosuppressed patients who developed incisional hernias are now treated primarily with autologous fascia lata grafts. There are currently 81 patients in the series with an overall recurrence rate of 29 percent. This increase in hernia recurrence is due in part to a longer follow-up period and in part to an increase in the percentage of patients in the series with multiple recurrent hernias and with chronic immunosuppression. This hernia recurrence rate is within an acceptable range for this group of extremely challenging patients.

Fascia lata grafts certainly are a major improvement over previous standard methods of bringing autologous tissue to the abdominal wall, such as large pedicled flaps like the rectus femoris flap, tensor fasciae latae flap, or latissimus dorsi flap. One major advantage of these grafts is that, unlike with synthetic mesh, the grafts do not have to be removed in cases of wound infection or wound breakdown with graft exposure. The major drawback of fascia lata grafts, however, is that they exist in a limited and easily exhaustible supply, and they can result in donor-site morbidities such as pain, seroma, and delayed ambulation.

Recent efforts in our research laboratory have focused on using acellular dermal matrix (AlloDerm, LifeCell Corporation, Branchburg, N.J.) for abdominal wall reconstruction. An initial feasibility study tested the AlloDerm for ventral hernia repair in a rabbit model to see whether it would revascularize in the abdominal wall.[3] Abdominal wall defects were created in 25 rabbits and repaired with AlloDerm (group A; $n = 10$), Micromesh [W. L. Gore and Associates, Inc., Elkton, Md. (group B; $n = 10$)], and primary closure

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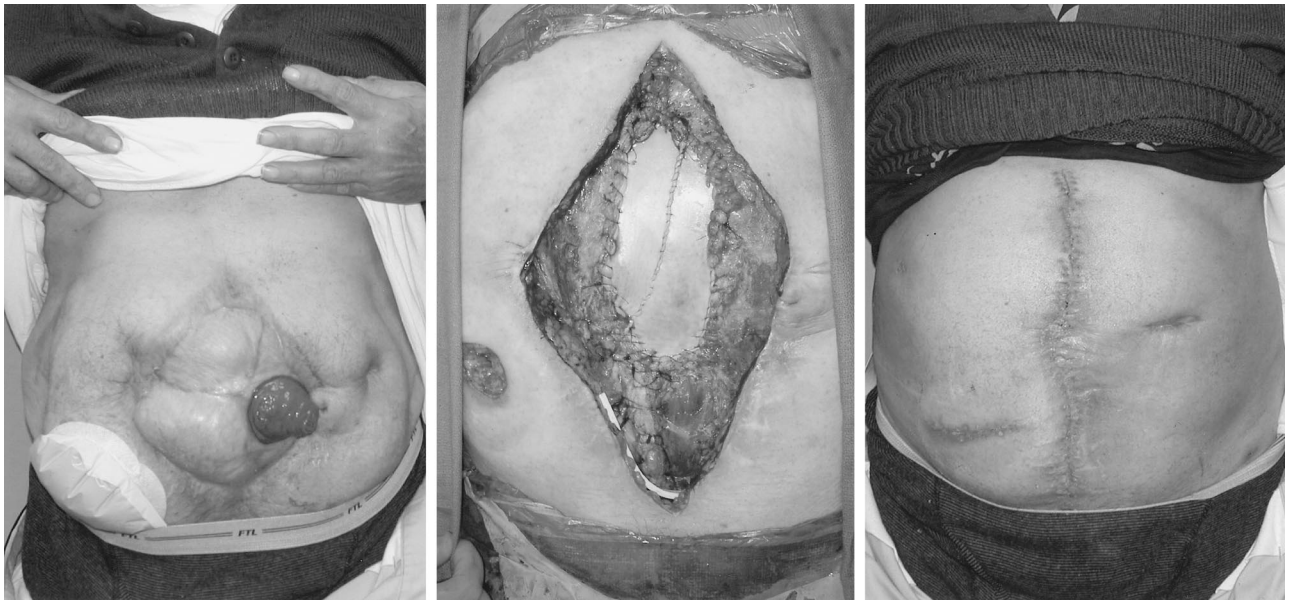

FIG. 1. (*Left*) Preoperative, (*center*) intraoperative, and (*right*) 1-month postoperative views of a gunshot victim with a complex abdominal wall defect that was treated with interpositional acellular dermal matrix. At postoperative month 6, there was no evidence of hernia recurrence.

(group C; $n = 5$). The defect measured 3×7 cm in groups A and B and 0.5×7 cm in group C. After 30 days, the abdominal walls were analyzed for presence of hernia, size of the implant, presence of intraabdominal adhesions, breaking strength of implant-fascial interface with the suture removed, and neovascularization, by fluorescein dye and histologic analysis.

There were no hernias in any of the groups. In eight out of 10 rabbits in the AlloDerm group, there was no change in implant size. The remaining two rabbits in the AlloDerm group had less than 1 cm of stretch in the horizontal dimension of the implant. Adhesions were seen in all of the rabbits in the Micromesh group but not in the other groups. There was no statistical (t test) difference in mean breaking strength between the AlloDerm fascial interface (288.6 ± 97.1 mN/mm^2) and the Micromesh fascial interface (337.0 ± 141.2 mN/mm^2). Infusion with fluorescein dye and histologic analysis indicated abundant vascular ingrowth into the AlloDerm. This study indicated that in the rabbit, AlloDerm does support vascular ingrowth when used for abdominal wall reconstruction and is as effective as Micromesh in repairing ventral hernias at 30 days.

Based on the success in the rabbit short-term model, a longer-term study is currently underway in pigs. Abdominal wall defects measuring 12×4 cm were created in 20 Yucatan minipigs. These defects were then repaired with either Gore-Tex (W. L. Gore and Associates, Inc.) ($n = 10$) or acellular dermal matrix derived from a pig ($n = 10$). Pig-derived dermal matrix was used to avoid any late xenogenic response to human proteins. This material is identical to AlloDerm except that it is derived from pigs. So far, one pig in each group has presented with a hernia (both within 4 weeks of the operation). Four additional pigs from each group were then harvested at 3 months after the operation. None of these pigs had hernias, and the dermal matrix had become vascularized as evidenced by intravenous fluorescein dye as well as histologic examination. Five additional pigs remain in each group to be assessed at 9 months after the operation.

We have proceeded with using human acellular dermal matrix for abdominal wall reconstruction clinically in very select patients. These are patients in whom synthetic mesh is contraindicated and fascia lata grafts are either undesirable or not available. So far, this technique has been performed in 13 patients with a mean follow-up period of 6 months (range, 3 to 12 months). In none of these patients has the AlloDerm had to be removed. Also, none of these patients have developed recurrent hernias thus far, although admittedly it is very early in the pilot series (Fig. 1).

In summary, since the publication of our series of fascia lata grafts, our indication for use of the grafts has expanded to routinely include immunosuppressed patients. The long-term results of using these grafts in this high-risk group of pa-

tients indicate an acceptable though far from perfect hernia recurrence rate. We are in the process of exploring the use of acellular dermal matrix for use in complex abdominal wall reconstruction, with promising early results. Reports of the long-term results in both our animal studies and our clinical experience will be forthcoming.

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