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CASE REPORT
Reconstructive

Composite Anterolateral Thigh and Fascia Lata Free Flap for Abdominal and Groin Reconstruction in a Pediatric Patient

Lacey R. Pflibsen, MD*
Chad M. Teven, MD*
Jaclyn N. Lundberg, BS†
Melinda K. Mabee, PA-C‡
Erin M. Garvey, MD§
Katherine P. Davenport, MD§
Jacob B. Hammond, MD¶
Timothy A. Schaub, MD‡

Summary: Large abdominal wall and groin defects present complex reconstructive challenges. These defects typically require free flap reconstruction to bring in healthy vascularized tissue and recreate the complex full-thickness defect. A 6-year-old previously healthy girl presented to our trauma center after sustaining a close-range shotgun injury resulting in a full-thickness defect to the inferior hemi-abdomen and groin. A composite anterolateral thigh flap with fascia lata free flap was performed to reconstruct the myofascial, skin, and subcutaneous tissue of the abdomen and groin. We present the first composite anterolateral thigh flap with fascia lata for full-thickness abdominal wall and groin reconstruction in a pediatric patient. *(Plast Reconstr Surg Glob Open 2021;9:e3837; doi: 10.1097/GOX.0000000000003837; Published online 4 October 2021.)*

Large abdominal wall and groin defects present complex reconstructive challenges.[1,2] Free tissue transfer may provide a large volume of healthy vascularized tissue to promote rapid healing and reduce the risk of infection while preventing an adjacent donor site defect.[2]

Previous reports in adults have documented the effective use of free composite anterolateral thigh (ALT) and fascia lata (FL) flaps for abdominal wall reconstruction.[3] Although free ALT flaps have also been utilized in pediatric cases,[4] no reports exist documenting the use of composite ALT and FL flaps for pediatric abdominal wall reconstruction. Here, we describe reconstruction of a full-thickness abdominal wall and groin wound in a pediatric patient using a composite ALT and FL flap.

CASE PRESENTATION

A healthy 6-year-old girl sustained a close-range shotgun injury to the left inferior hemi-abdomen and groin. Multiple injuries were noted, including hollow viscous injury and open iliac crest fracture. The patient underwent washout of the wound and end-to-end colonic anastomosis on hospital day 1, with a return for further washout and debridement on hospital day 2 and 3. Temporary closure of the groin was obtained with negative pressure wound therapy. The patient's defect measured 22 × 12 cm soft tissue defect of the abdomen and groin, an 8 × 8 cm full-thickness abdominal wall defect, and a traumatic groin hernia (Fig. 1).

Reconstruction was performed on hospital day 4 using a contralateral 15 × 5 cm composite ALT and FL flap based on a single cutaneous perforator measuring 1.5 mm in diameter (Fig. 2).[5] Surgical markings and flap elevation were performed as classically described and with the assistance of Pencil Doppler.[5] The artery was anastamosed end to side to the external iliac artery with a 2-mm punch, and the vein was anastamosed end to end to a 2.5-mm branch off the superficial iliac vein. All anastomoses were hand sewn with 9-0 Nylon suture and end-to-end. The FL was inset inlay into the remaining abdominal fascia and pelvic musculature. The abdominal wall, femoral vessels, and iliac crest open fracture were completely covered and a 160-cm^2 dermal regeneration template was placed on the remaining proximal thigh (Fig. 3). The donor site required a dermal regeneration template to facilitate closure. Postoperatively, the patient was monitored with implantable Doppler monitoring, and clinical examinations were performed. The patient was kept in a warmed room with application of a forced air-warming device over the flap, given 81-mg ASA

*From the *Division of Plastic Surgery, Mayo Clinic Arizona, Phoenix, Ariz.; †Department of Education, Creighton University School of Medicine, Omaha, Neb.; ‡Division of Plastic Surgery, Phoenix Children's Hospital, Phoenix, Ariz.; §Division of Pediatric Surgery, Phoenix Children's Hospital, Phoenix, Ariz.; and ¶Department of Surgery, May Clinic Arizona, Phoenix, Ariz.*

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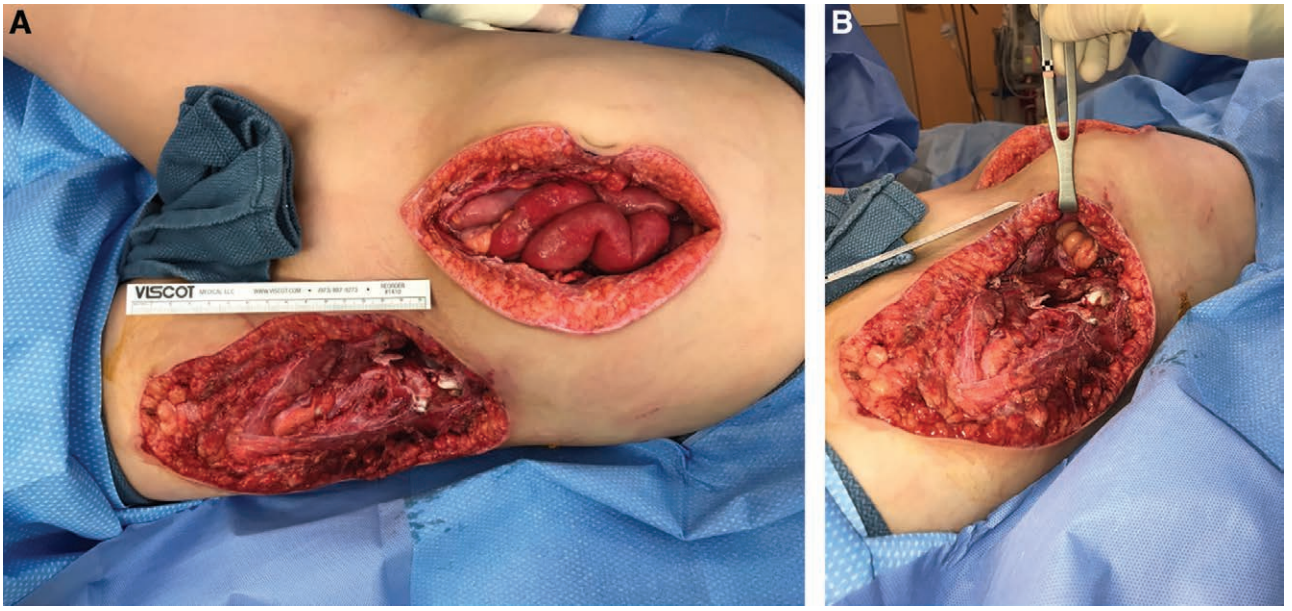

Fig. 1. Abdominal and groin defect immediately before ALT with vascularized FL. A. Anterior view of defect. B. Oblique view showing groin hernia.

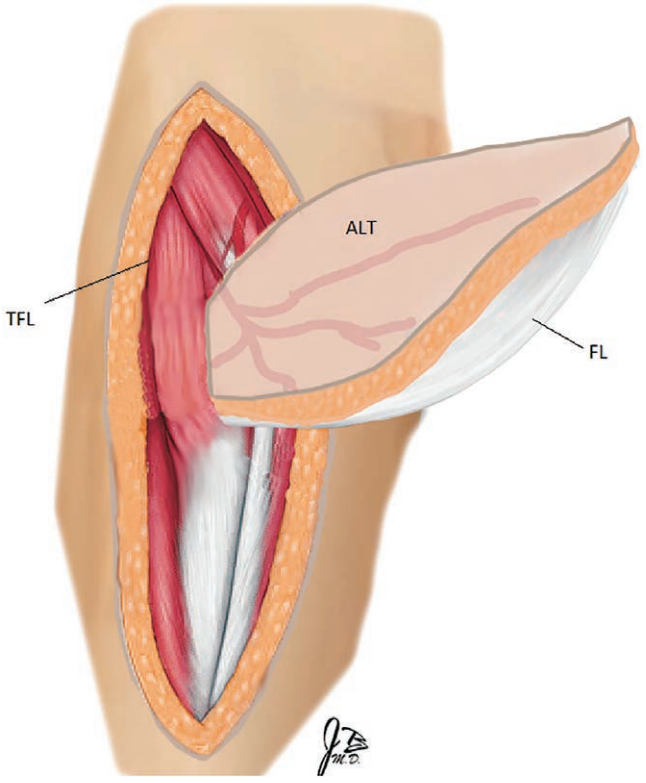

Fig. 2. Schematic of the preoperative markings and elevation of the composite ALT with vascularized FL.

and resuscitated with crystalloid. The patient required approximately 12 hours of vasopressor support.

Fecal matter was noted in the wound on postoperative day 6 after free flap due to a leak at the colonic anastomosis. The patient returned to the operating room for anastomotic repair, end colostomy, wash out, and removal of dermal regeneration template. Due to diffuse edema, the abdomen was left open temporarily until postoperative day 17, when it was subsequently closed. Local wound care was performed to the groin wound.

At 3 weeks, the remainder of the left thigh and donor sites were closed primarily (Fig. 4). Colostomy was taken down at 4 months, and the area of previous traumatic groin hernia was without any residual defect or hernia appreciated. Assessment at 16 months demonstrated no donor deficit or evidence of recurrent hernia.

DISCUSSION

Free flap reconstruction in pediatric patients has historically been unfavorable due to concerns regarding perforator size and perforator development.[4] We have since learned that perforator vessels are indeed suitable to perfuse large skin paddles, especially if more than one perforator is incorporated.[4] Gharb et al found that the ALT flap in patients younger than 8 years of age typically have perforators almost half the size of those of the children greater than 8 years of age (2.4 mm versus 4.3 mm, $P < 0.01$).[4] Although smaller vessel caliber has been suggested to be more technically demanding in patients younger than 8 years, it does not confer significant differences in flap elevation time or flap survival versus older age groups.[4] Similarly, Upton et al found that although microsurgical free tissue transfers in pediatric patients are more complex than in adults, younger patients can achieve superior results due to decreased incidence of comorbidities.[6]

Other considerations for pediatric patients include minor alterations in skin anatomical landmarks and markings due to pediatric thigh girth-to-length ratio being larger in comparison with that of the adults.[4] This can lead to flap design that is too large for primary skin closure. Therefore, it has been suggested to place the medial

Fig. 3. Inset of composite ALT with vascularized FL free flap.

Fig. 4. Final closure of the leg and flap.

incision more toward the lateral intermuscular septum.[4] In our case, flap design was larger than what could be closed primarily due to the need for more soft tissue coverage. An additional free flap (latissimus dorsi muscle or combined ALT with tensor fasciae latae muscle) was considered; however, the opportunity to perform one large composite free flap and minimize the morbidity and risk of a secondary free flap or chimeric free flap was considered superior. Other reconstructive options including latissimus dorsi or contralateral vertical rectus myocutaneous flap are well documented in the adult literature and considered for this patient.[1,7,8] However, the fasciocutaneous ALT flap was preferred in this patient due to its donor site, and the ability to preserve functional muscle, as it would be important in rehabilitation.[9,10]

The use of composite ALT with fascia lata for full-thickness abdominal wall and groin defects is novel in the pediatric literature. The flap utilizes the prefascial and subfascial vascular plexus when attached to the ALT flap.[3,11] This can be observed with bleeding of the fascial edges on re-anastomosis, which we perceived intraoperatively as well. This is different than the combined ALT with TFL muscle flap, which has also been used to similarly fill a large abdominal full-thickness defect; however, this double flap is less ideal because it is more technically demanding, time-consuming, compromises muscle that is important in pelvic stability, and creates a large donor site near a flexion crease.[3,12]

The composite ALT with fascia lata flap utilizes a large segment of the tensor fasciae latae.[3] As the iliotibial tract is important in providing lateral knee stabilization, questions could arise about functional deficits with its partial loss. Kuo et al found an average donor site deficit of 30% quadriceps strength compared with the contralateral leg when evaluating adult patients. Studies evaluating functional loss after tensor fasciae latae harvest report that most patients experience some leg pain and limping for less than 1 week with no long-term functional difficulties.[13] Its effect on the pediatric growing patient is difficult to determine. Hu et al used composite ALT with fascia lata as well as nonvascularized components of the iliotibial band in pediatric lower extremity reconstruction. Their data suggest that functional deficits are mild and do not interfere with daily activities.[14] Our patient was able to walk, run, and play without pain or difficulty; however, long-term follow-up to adulthood is needed.

CONCLUSIONS

The use of composite ALT with fascia lata free flap can be effective in the reconstruction of full-thickness abdominal and groin defects in pediatric patients. Although free flap reconstruction in pediatric patients is technically challenging, it is a valuable tool that should be considered in complex cases.

Timothy A. Schaub, MD
Phoenix Children's Hospital
1920 E Cambridge Ave, Suite 201
Phoenix, AZ 85016
E-mail: tschaub@phoenixchildrens.com

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