Reconstruction of Complex Post-Traumatic Perineal/Pelvic Defects Using a Pedicled Anterolateral Thigh Flap in a Child

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Summary

The complexity of the female pelvis and perineum becomes evident when traumatic or surgical defects need to be reconstructed; consideration should be given to the restoration or preservation of the most important functions subserved by this anatomic region. We used a composite pedicled fasciocutaneous anterolateral thigh flap with an innervated vastus lateralis muscle to reconstruct the pelvic ring, vagina, clitoris, labia and mons pubis. Unaided ambulation, urinary and anal continence were successfully restored. An appropriately designed pedicled ALT flap can be successfully used to achieve excellent pelvic/perineal reconstruction and functional restoration in complex pelvic/perineal defects, even in children.

Key Words: Trauma, Perineum, Pedicled ALT, Reconstruction

Introduction

The anatomy of the female perineum and pelvis and the functions of these structures are highly complex. This normal anatomy is difficult to restore following extensive disruption of any kind (usually following trauma or oncologic resection) while aesthetic reconstruction may be feasible, functional restoration is a much more difficult goal. This anatomic region is host to the urethra, vagina and anus, the pelvis and the hip joints (responsible for weight transmission and ambulation).

We present a case report of a 10 year old child who sustained severe injuries to her pelvis and perineum following a motor vehicle accident; her complex defect was successfully reconstructed with the use of a pedicled anterolateral thigh flap that included fascia and innervated vastus lateralis muscle.

Case Presentation

A 10 year-old girl who had sustained severe injuries to her pelvis and perineum was referred to our facility after one week of treatment in another hospital. A sigmoid colostomy and a suprapubic cystostomy were used to divert stool and urine, respectively. An initial evaluation under anesthesia found an infected degloving injury of the mons pubis, and a fracture and complete disruption of the pelvic ring anteriorly. The urethra and anterior wall of the urinary bladder were visible through the wound, as were parts of necrotic pubic bone. The anterior half of the vagina and parts of the clitoris and labia were also missing. The anal sphincter was disrupted anteriorly (Figure 1a,b). Radiographs of the pelvis revealed bilateral sacro-iliac joint disruption, with fractures of the acetabulum and pubic rami. Necrotic pubic bones were debrided, leading to a large bony defect anteriorly. CTscan confirmed the clinical and plain radiograph findings (Figure 1b). During the final reconstruction, an external fixator and two sacro-iliac screws were used to stabilize the pelvic ring (Figure 2a). A composite anterolateral thigh flap that included skin islands, fascia and innervated vastus lateralis muscle was used to reconstruct the soft tissue defect, and bridge the pelvic defect anteriorly (Figure 2b).

The muscle was carefully contoured around the bladder neck, with a re-creation of a bladder neck-urethral angle to aid continence. The fascia was sutured to the periosteum of the remainder of the pubic bones on either side, superiorly to the anterior abdominal wall musculature, reconstructing the inguinal ligament and completing the pelvic ring anteriorly. The anal sphincter was repaired. The skin flaps were used to reconstruct the anterior wall of the vagina, urethral meatus, and parts of the clitoris and labia. A urethral catheter was used to stent the urethra following the reconstruction. Repeated fecal

soiling and infection of the external fixator pin-tracts led to the revision of the colostomy to the transverse colon. Pelvic radiographs at 8 weeks indicated that all fractures had healed. The patient was ambulated with support, the external fixator removed and the patient taught to ambulate using crutches.

The bladder leaked when filled with 100 milliliters of saline; the supra-pubic and urethral catheters were spigotted, with the bladder being emptied at increasing intervals until she was able to hold urine for at least six hours. The urethral catheter was then removed and at four to six hours, there was minimal urine leak, suggesting sphincter continence. The suprapubic catheter was discontinued, and after about two weeks she reported being completely dry both during the day and night. At 12 weeks, colostomy closure was performed, and at 16 weeks, she reported continence of both urine and stool. She is able to walk without any aid, and has no evidence of hernia (Figure 3). She and her mother were pleased with her reconstructed external genitalia (Figure 4). She is currently being followed up annually, with a focus on the long term risk of hip joint osteoarthritis.

Figure 1a
Intra-operative picture during third debridement. Note necrotic pubic bone to the left. Note the suprapubic cystostomy and initial sigmoid colostomy and are in view

Figure 1b
3D reconstruction of the pelvis after debridement. Note complete loss of the anterior component of the pelvic ring

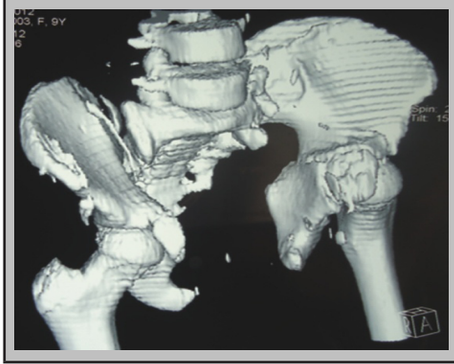

Figure 2a
Plain radiograph showing sacroiliac screws and an external fixator to stabilze the pelvis and hold the reconstruction

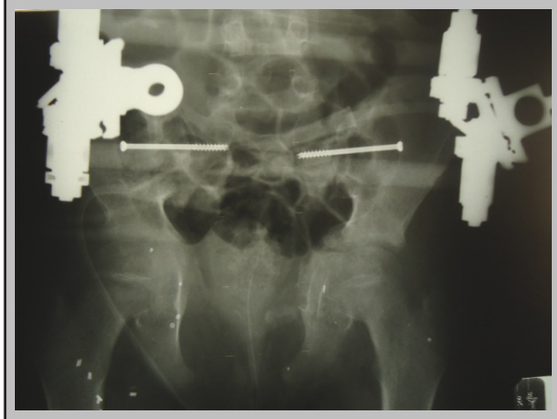

Figure 2b
ALT fasciocutaneous flap with 2 island skin flaps

Figure 3
Six month postoperative picture of the lower anterior abdominal wall showing no evidence of hernia

Discussion

The anterolateral thigh flap is considered by many the plastic surgeons' reconstructive workhorse, especially as a free flap, where it has been used for defects from 'head to toe' (1). As a pedicled flap, it has been used for the reconstruction of defects from the middle of the leg to the epigastrium, including the reconstruction of a full-thickness anterior hemi-abdominal wall defect (2). It may be harvested as skin flap, fasciocutaneous flap, or be designed to include the vastus lateralis muscle, depending on reconstructive requirements of the defect. Use of the free ALT is well described in children (3–5). The use of the pedicled ALT in children is not as well described in literature (6).

The defects in the patient presented included: a skeletal defect (absence of the pubic bones and disrupted sacro-iliac joints), a complex soft tissue defect (mons pubis, part of the clitoris, labia majora and minora, urethral meatus and the anterior part of the pelvic diaphragm). A composite pedicled ALT flap was considered adequate for the initial reconstruction and stabilization, with the option of using a free fibular flap later, should the pelvic ring remain unstable. The fascia was used to complete the pelvic ring. It also provided anterior support to the pelvic diaphragm. The muscle bulk helped fill the space of Retzius, recreate the bladder neck – urethral angle, and complete the pelvic diaphragm anteriorly. The free ALT has been use in the reconstruction of the vulva following oncologic resection (7). The use of the pedicled ALT in reconstruction of complex pelvic and abdominal post-oncologic resection defects in a series of 17 patients was recently reported by Lannon et al (8). Whereas exact reconstructive needs following oncologic resection can be predicted ahead of surgical intervention, the same is not true of post-traumatic defects. The authors elected to use the pedicled anterolateral thigh flap for this patient as it met most of the desired reconstruction needs.

At 12 months, the patient has gone back to most of her pre-injury activities, although she finds long walks strenuous. She currently has no pain in the performance of most of her activities, but has been placed under a long term follow-up because of the heightened risk of early hip joint osteoarthritis. The pedicled ALT flap with its modifications is thus an excellent flap for complex reconstruction of defects in children where appropriate. As evidenced in this report, multiple reconstructive needs, both functional and esthetic, were solved with the use of this highly versatile and reliable flap.

Conclusion

An appropriately designed pedicled ALT flap can be successfully used to achieve excellent pelvic/perineal reconstruction and functional restoration in complex pelvic/perineal defects, even in children.

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