

ORIGINAL ARTICLE

The versatility of tensor fascia lata allografts for soft tissue reconstruction

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Abstract

The purpose of this retrospective study was to introduce our successful use of tensor fascia lata allograft to reconstruct various soft tissue defects. Since May 2021, we have applied tensor fascia lata allografts in eight cases. A frozen type of fascia of 0.6 mm thickness was used in all cases, and allografts were covered by vascularized soft tissue. We used tensor fascia lata allograft in eight cases to cover the infected wounds, donor site closure, and pedicle protections. These were abdominal wall and back reconstructions following rectus muscle and latissimus dorsi muscle harvest, coverage of infected spine wound after posterior fusion, pressure ulcer reconstruction, and pedicle protection of free and pedicle flaps. The follow-up periods were from one to 14 months. None of the cases showed wound problems after initial reconstruction using tensor fascia lata allografts. Tensor fascia lata allograft could be an excellent cost-effective surgical option comparable to autologous tissue grafts. *Level of evidence: IV.*

KEYWORDS

allograft, fascia, Fournier's gangrene, keystone flap, pressure ulcer, tensor fascia lata, wound

Key Messages

- we used tensor fascia lata allograft to cover the infected wounds, donor site closure, and pedicle protections
- tensor fascia lata allograft could be an excellent cost-effective surgical option comparable to autologous tissue grafts
- postoperative computed tomography findings revealed that implanted tensor fascia lata allograft is well maintained without a noticeable problem

1 | INTRODUCTION

Tensor fascia lata has been reported in surgical reconstructions such as massive rotator cuff tears, facial paralysis, and blepharoptosis.¹⁻⁴ It is also used for aesthetic purposes such as augmentation rhinoplasty.^{5,6} This is

because tensor fascia lata are abundant, safe to harvest, and have sufficient tissue coverage and strength.

Nevertheless, because of donor site morbidity after autologous fascia lata harvest, physicians are reluctant to use this useful material despite the advantages mentioned earlier.⁷ This is because the harvest of tensor

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TABLE 1 Patient demographics

Patient No.	Gender	Age	Diagnosis	Treatment (plastic surgery department)	Follow-up period
Wound closure					
1	Female	44	Glioblastoma Soft tissue defect, scalp CSF leakage Omayya reservoir infection	Galeal flap Temporalis muscle flap	1 y
2	Male	41	Pressure ulcer, sacrum	Keystone flap	1 y
3	Female	69	Wound infection, back	Bilateral paraspinous muscle flap	2 mo
Donor site closure					
4	Male	64	Squamous cell carcinoma, upper abdomen, Rt.	Wide excision VRAM flap	1 y
5	Female	78	Adenoid cystic carcinoma, shoulder, Lt.	Wide excision LD myocutaneous flap	1 y
6	Male	61	Fournie's gangrene	VRAM flap	2 mo
Pedicle protection					
7	Female	90	Malignant melanoma, cheek, Lt. with parotid metastasis	Wide excision PMMC flap	1 mo
8	Male	73	Squamous cell carcinoma, mouth floor and tongue, Rt.	RFFF STSG	4 mos

Abbreviations: CSF, Cerebrospinal fluid; LD, Latissimus dorsi; PMMC, Pectoralis major myocutaneous; RFFF, Radial forearm free flap; STSG, Split thickness skin graft; VRAM, Vertical rectus musculocutaneous.

fascial lata needs relatively long incisions. Although minimally invasive harvest techniques have been attempted, the procedure still leaves a scar on the upper lateral thigh.⁸

The current study aims to introduce our experience of tensor fascia lata allograft for various soft tissue reconstructions.

2 | PATIENTS AND METHODS

All research procedures in this study were performed in accordance with the ethical guidelines of the 1975 Declaration of Helsinki. Written informed consent was obtained from all patients. All patients in our study provided consent to publish the information.

Tensor fascia lata allografts obtained from the local tissue bank, approved by Korea Food and Drug Administration, were harvested from cadaver donors. All donors had undergone standard screening tests for transmissible diseases such as human immunodeficiency virus, hepatitis viruses (Hepatitis B virus and Hepatitis C virus), cytomegalovirus, and the Venereal Disease Research Laboratory test for syphilis. After culture before initial processing, washing (H₂O₂, alcohol, H₂O) and aseptic sealing were done. Then, allografts were treated with gamma irradiation (25 KGy) and then stored at -70°C.

Before distribution to the clinical site, the Korea Food and Drug Administration routinely performed the final culture. This process was previously described by Kim et al in 2011.⁹

Baseline patient characteristics are depicted in Table 1.

3 | RESULTS

Tensor fascia lata allografts were used for wound closure in Cases #1 through 3 for donor site closure, Cases #4 through 6, and pedicle protection in Cases #7 and #8. We also used tensor fascia lata as background material for microvenous anastomosis in Case #8. Representative cases are presented in Figures 1-6. The postoperative course was uneventful in all cases.

4 | DISCUSSION

The current study showed the versatile use of tensor fascia lata allograft for wound closure, donor site closure, and pedicle protection.

Although we have not conducted any pathologic confirmation of how implanted tensor fascia lata allograft is incorporated into the wound, the fact that we have not

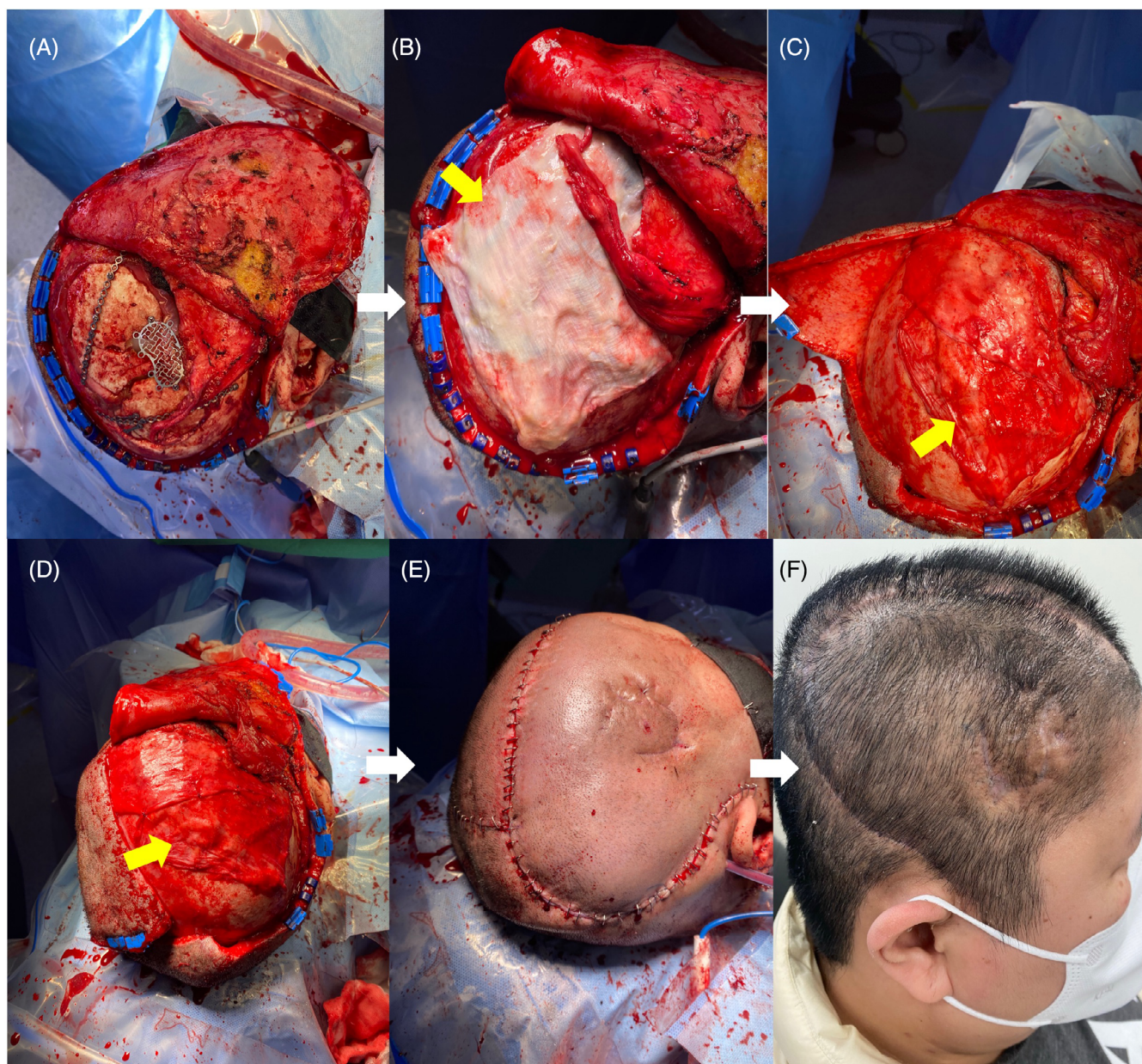


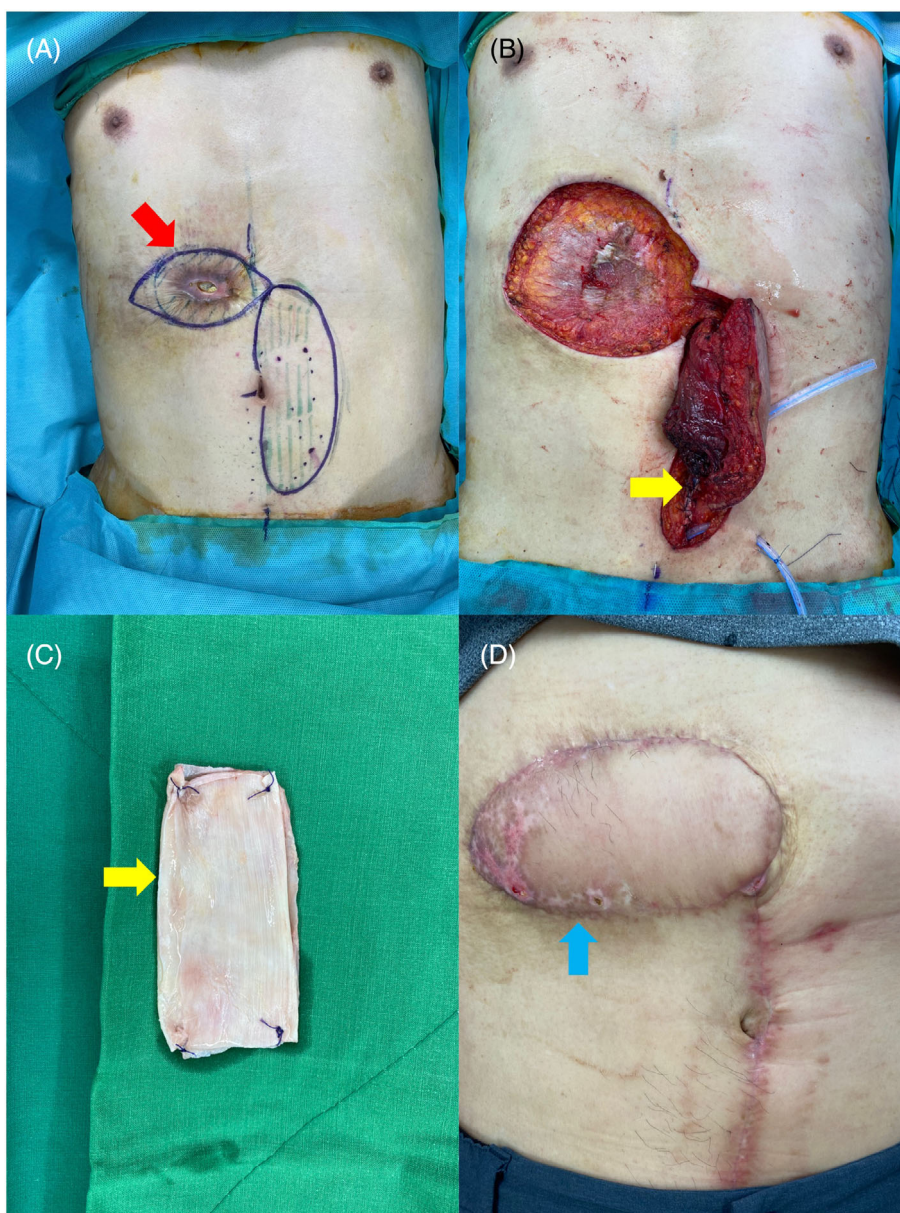
FIGURE 1 Initially, the Neurosurgery department called for wound closure under local anaesthesia. At that time, the skin flap was non-viable and thin, exposing the underlying structure. Omayra reservoir had to be in place. We covered the wound with local flap rotation. Two months after the initial local flap coverage, the patient was brought to the hospital with rapidly growing glioblastoma. A, The neurosurgery team did a frontal lobectomy, and the picture showed the appearance immediately after Rt. Frontal lobectomy and plate reconstruction by the neurosurgery team. However, they could not close the wound and consulted our department for wound closure. B, Tensor fascia lata allograft was implanted above the plate and reconstructed cranial bone. Temporalis muscle flap was also elevated to reinforce the wound coverage. C, A galeal flap was also elevated and fixated to the tensor fascia lata allograft. D, Appearance just after inset of galeal flap, tensor fascia lata allografts, and temporalis muscle flap. E, Immediate after skin closure. F, One month after the surgery

encountered any wound complications is one of the most vital pieces of evidence of how this implantation technique is valuable and safe for soft tissue reconstructions.

Also, computed tomography findings taken postoperatively revealed that tensor fascia lata allograft is well vascularized into the wound with the sufficient bulkiness.

Therefore, when surgeons plan to close wounds with vascularized tissue, the addition of tensor fascia lata allografts can support the vascularized flap incorporated into the wound bed. When closing the muscle defect such as rectus muscle defect after transverse or vertical rectus abdominis flap harvest, plastic surgeons have commonly applied an acellular dermal matrix.

FIGURE 2 A, A 64-year-old male patient was presented with ulceration with discharge in the middle of the old burn scar. About 30 years ago, he had a contact burn injury in his right upper quadrant abdomen. We were suspicious of the possibility of malignant transformation of majorlin's ulcer. This is a preoperative design. B, Wide excision was done, the left vertical rectus myocutaneous flap was elevated, and tensor fascia lata allograft was implanted at the rectus muscle defect area. C, We folded 10×10 sized tensor fascia lata allograft into 10×5 cm in size and sutured it with vicryl 3-0. D, The postoperative appearance took 5 weeks after the surgery



One of the potential obstacles to the widespread application of acellular dermal matrix is criticism regarding cost-effectiveness. In this clinical situation, tensor fascia lata allograft provides cheaper but robust strength to the abdominal wall reconstruction and minimises wound infection rates.

Żurek et al showed features of angiogenesis, both in the recipient site and in the grafted fascia fragment, along with a small number of lymphocytes, but without any inflammatory infiltrations.¹⁰ These histologic findings supported our current results that this tensor fascia lata allograft could enhance angiogenesis.

Special considerations should be made when using the tensor fascia lata allografts. First, tensor fascia lata allograft causes more early postoperative fluid drainage

than without the use of tensor fascia lata allograft. For this reason, surgeons should maintain the drainage system longer than usual cases.

Second, although this was not confirmed in our current study, we assumed that tensor fascia lata allograft would not be an ideal material for reconstructing ischemic tissue. This is because tensor fascia lata allograft requires sufficient blood supply to be incorporated into the surrounding tissue.

Despite these limitations, our data suggest that tensor fascia lata allograft can expand to achieve high rates of successful wound closure, demonstrating more excellent resistance to bacterial inocula in contaminated wounds such as pressure ulcers that we used under the flap above the debrided bony prominence.¹¹

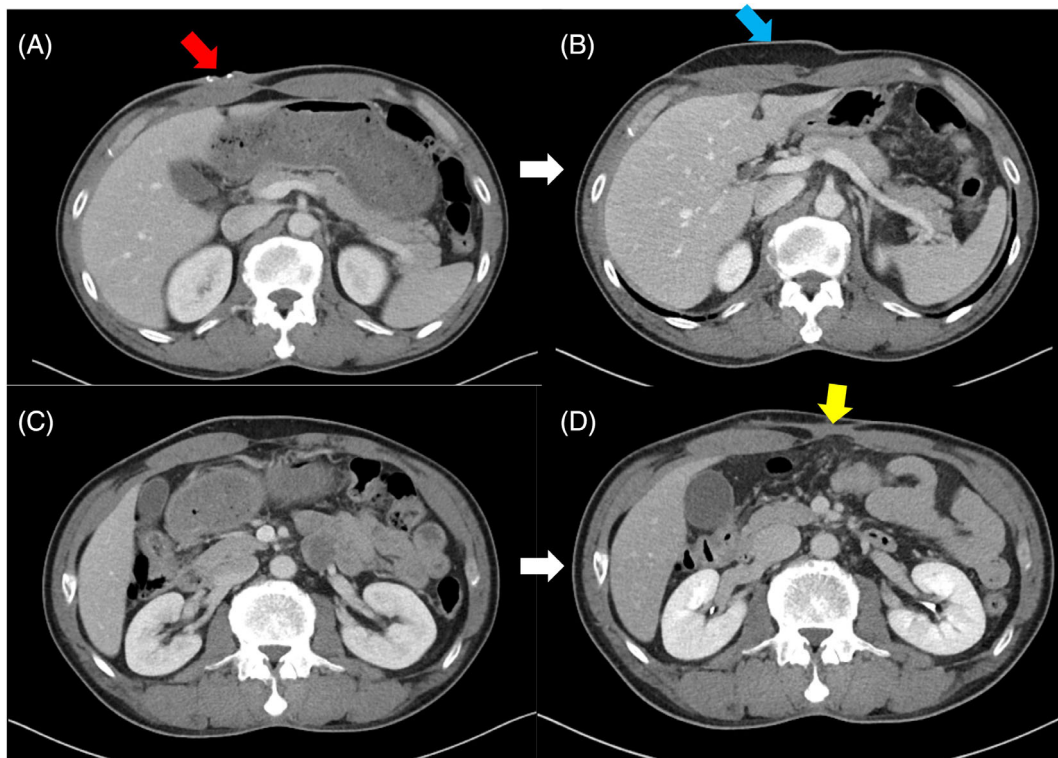


FIGURE 3 A, On the computed tomography (CT) scan, we noticed 4 cm sized skin thickening and ulceration at his right upper quadrant abdominal wall. (Red arrow) The inflammatory lesion adjacent to the skin thickening area was mainly located at the subcutaneous layer connected with the right rectus muscle. B, This is a CT scan taken postoperatively for 4 months. We can see a well-maintained flap (blue arrow). C, Preoperative CT scan. D, Postoperative CT scan revealed well maintained implanted tensor fascia lata allograft (yellow arrow) connected to the right rectus muscle

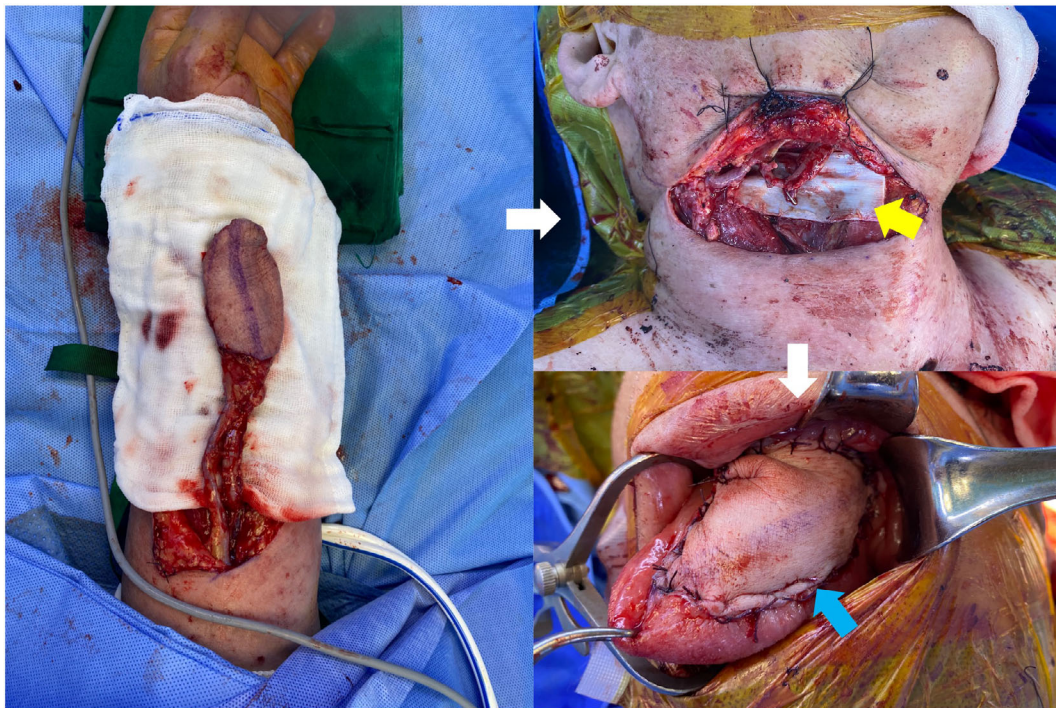


FIGURE 4 A, Intraoperative appearance just before pedicle ligation. A 6×5 cm radial forearm free flap was harvested from the patient's left forearm. We included a radial artery/vein and a cephalic vein in the flap. B, We used tensor fascia lata allograft as background material for microanastomosis and wrapped the pedicle with the allograft to protect the pedicle from surrounding fluid collection or bloody discharge. C, Intraoperative view of the reconstructed tongue with radial forearm free flap

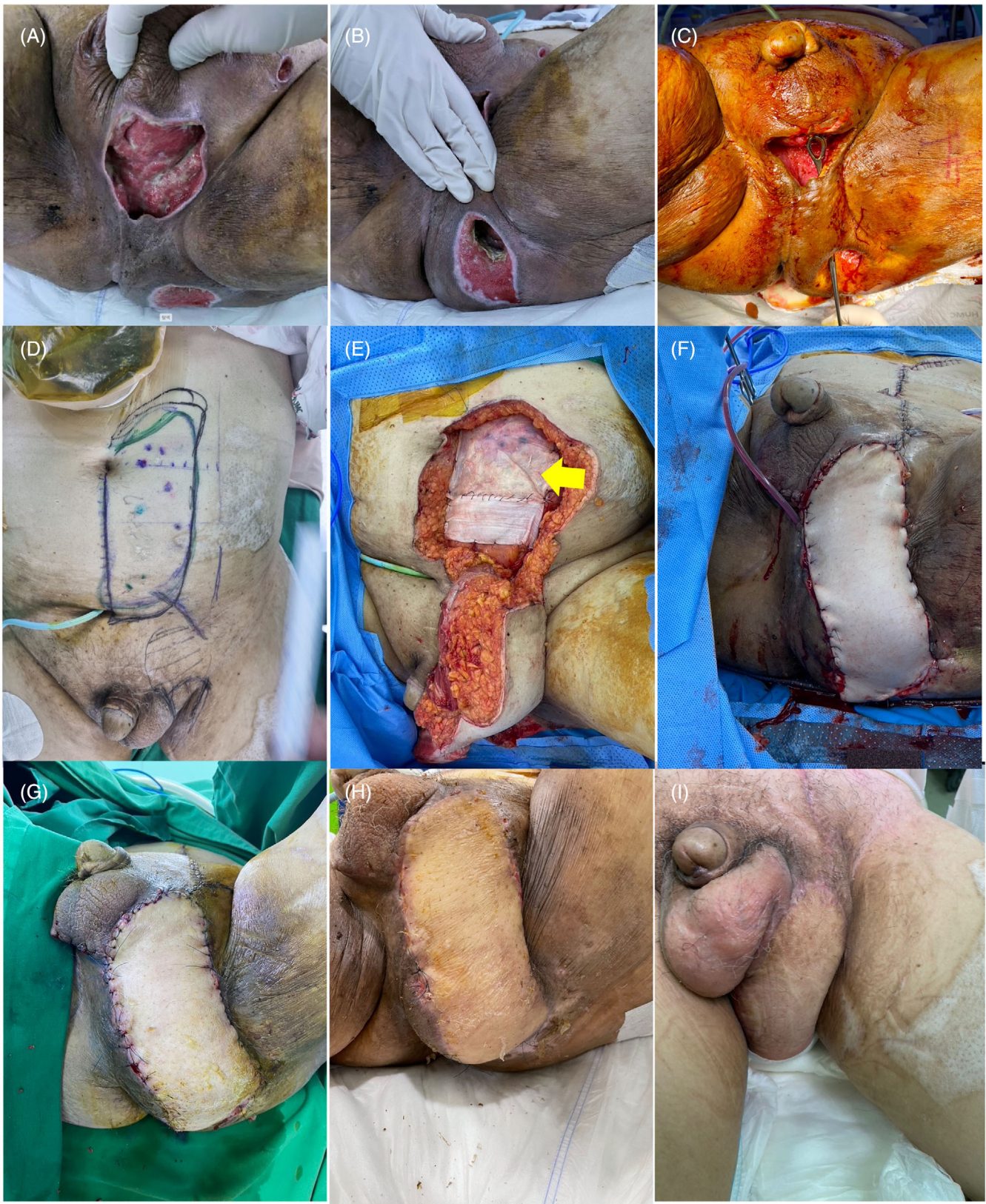


FIGURE 5 A-C, A 64-year-old paraplegic patient had Fournier's gangrene and pressure ulcer in his left anorectal area and ischial tuberosity. He also had a cystostomy along with T-colostomy. Despite these obstacles, we designed a vertical rectus abdominis flap at his left abdomen. D, Preoperative design of vertical rectus abdominis flap. E, We elevated vertical rectus abdominis myocutaneous flap to reconstruct the soft-tissue defect. As shown in the figure, we reconstructed the rectus muscle defect with an unfolded 10×10 sized tensor fascia lata allograft and a folded 10×4 cm sized allograft. F, Intraoperative view revealed that the flap successfully reconstructed the defect. G, Postoperative appearance 10 days after surgery. H, Postoperative appearance 3 weeks after surgery. I, Postoperative appearance 3 months after surgery

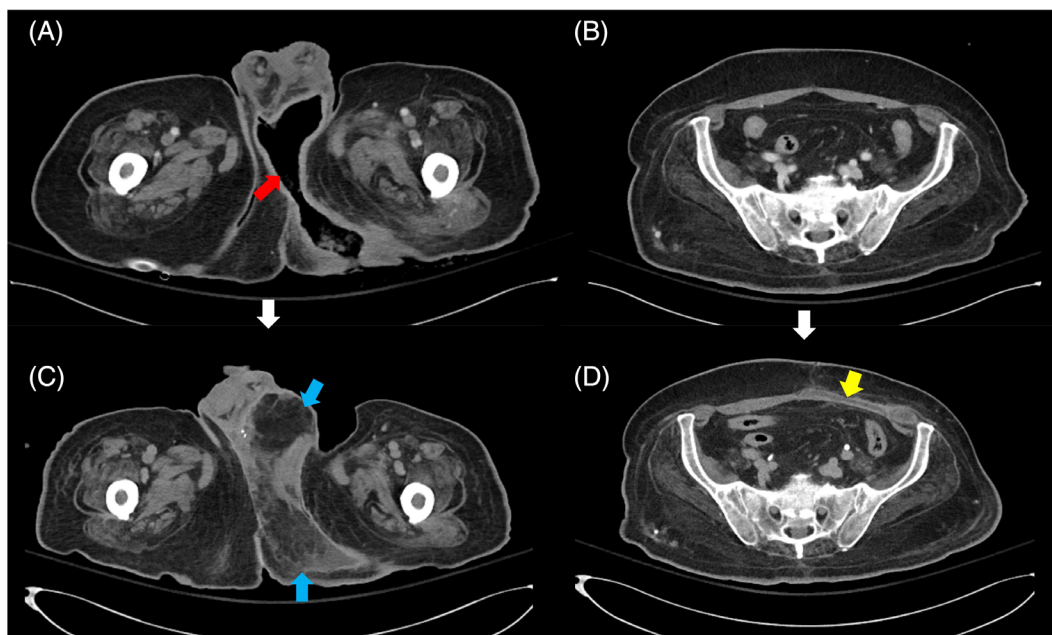


FIGURE 6 A, B, Preoperative computed tomography (CT) findings showed a soft-tissue defect in his penoscrotal area extending to the left ischial tuberosity (red arrow). C, Postoperative CT findings revealed that the vertical rectus abdominis musculocutaneous (VRAM) flap successfully replaced the soft-tissue defect (blue arrow). D, Postoperative CT findings also revealed that implanted tensor fascia lata allograft is well maintained at the position of the left rectus muscle without a noticeable problem (yellow arrow)

In addition, the price of tensor fascia lata allograft is approximately \$300, while the exact size of an acellular dermal matrix is \$3600 (the cost of a 1 cm × 1 cm acellular dermal matrix is about \$36).

Although we did not perform an objective cost analysis in this study, we assumed this would be a cost-effective reconstructive option for most clinical cases compared to acellular dermal matrix usage when adequately indicated.

5 | CONCLUSION

Tensor fascia lata allograft could be an excellent cost-effective surgical option comparable to autologous tissue grafts.

AUTHOR CONTRIBUTIONS

Tae Hwan Park solely designed, performed the research, analysed the data, wrote the paper, and finally reviewed the manuscript.

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CONFLICT OF INTEREST

The authors have no conflict of interest regarding the submitted work.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

The displayed study was carried out with respect to high ethical standards. All the studies have been approved, when required, by the appropriate ethics committee and have, therefore, been performed in accordance and in conformity to the World Medical Association Declaration of Helsinki (June 1964) and subsequent amendments.

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