



Reconstruction of Massive Lower Extremity Traumatic Injuries: The Role of RECELL®



Ethan Paulin, Marc Gorvet, Tim Wolff, Brian Temple, Steven Agafonoff, Elizabeth Zellner, Helen Perakis, Edmond Ritter

School of Medicine

Department of Surgery

BACKGROUND

- Massive lower extremity trauma often results in complex injuries involving multiple tissues risking significant patient morbidity.
- Reconstruction with skeletal fixation and durable overlying soft tissue coverage is essential to recover function.
- The free Latissimus Dorsi (LD) flap is a popular flap for this purpose due to its potential for broad coverage, as well as its reliability and versatility.
- The skin paddle that can be harvested with the LD flap, however, is limited, and a split-thickness skin grafts (STSG) is often required, resulting in an additional donor site.
- The RECELL® technology produces autologous skin cell suspensions (ASCS) which can be combined with STSG and allow for wider meshing ratios and thus expanded coverage from donor skin.

OBJECTIVE

Review outcomes of our series of traumatic lower extremity wounds reconstructed using a free LD flap in combination with STSG and ASCS.

METHODS

- A prospective case series was undertaken at our level I trauma center. Consecutive patients with complex massive lower extremity traumatic injuries who underwent limb-salvage with LD flap reconstructions combined with STSG and ASCS from January 2023 to June 2023 were included.

SURGICAL PROTOCOL

- All patients underwent staged reconstruction after bony fixation by one attending surgeon (ER).
- **Initial stages:** After appropriate wound bed debridement and bony fixation, LD free flaps were anastomosed, and dermal matrices were applied to build tissue beds appropriate.
- **Final reconstruction:** A widely meshed STSG (3:1) and ASCS were applied to the neodermis.
- **Dressings:** Non-absorbent porous dressings were applied, with negative pressure wound vacuum therapy (NPWT) as secondary dressing, for 7-days.

OUTCOMES RECORDED

- Charts were reviewed and information on patient demographics and perioperative details were extracted.
- All patients were followed post-operatively for 6-months at minimum.
- Descriptive statistics were performed.

RESULTS

- Seven patients (2 females and 5 males) were included with a mean age of 41.6 years (range 27-85 years).
- All patients experienced complex lower extremity trauma involving multiple fractures requiring fixation and significant soft tissue defects (wound area: 200-900 cm²); n=4 motor vehicle struck, n=3 motorcycle crashes.
- Average number of operations: 4.5. STSG take after final reconstruction: 100% in all patients. No regrafting or revision procedures required for soft tissue defects, and no infections or other complications were recorded.
- Average LOS: 31 days (range 21-36). At 6-month follow-up, the overlying soft tissue remained intact and durable with evidence of repigmentation. Patients reported high levels of satisfaction and excellent return of limb function.

EXAMPLE CASES

#1: 48-year-old Male | Ped-Struck | Complex Circumferential Right Lower Extremity Injury



#2: 38-year-old Female | Ped-Struck | Complex Circumferential Left Lower Extremity Injury



CONCLUSIONS

- Charts were reviewed and information on patient demographics (age, gender, smoking status) and perioperative details (procedures performed, readmission, reoperation, length of stay (LOS)) were extracted.
- All patients were followed post-operatively for 6-months at minimum. Descriptive statistics were performed.