

### Abstract

The purpose of this case study is to investigate the post-operative outcome following the application of continuous external tissue expander (DermaClose™) without the use of a negative pressure wound vac in a patient that sustained a gunshot wound to the left lower abdominal quadrant and suprapubic area. Patient presented to Aventura Hospital Medical Center Emergency Department, trauma bay, GCS 14 with palpable pulses of the left lower extremity and non-palpable femoral, popliteal, dorsalis pedis (DP), and posterior tibialis (PT) pulses of the right lower extremity. Patient was re-vascularized emergently with results of dopplerable and palpable DP and PT. He then went on to develop post operative compartment syndrome of the right lower extremity and underwent emergent medial and lateral fasciotomies, multiple irrigation and application of negative pressure wound vac by the trauma team in effort to salvage the limb. Right lower extremity limb salvage and delayed closure of right lower extremity fasciotomy sites, measuring 10cm x 40cm on the medial aspect and 14cm x 40cm on the lateral aspect, down to level of muscle and tendon. Application of continuous external tissue expander (DermaClose™) was applied to both medial and lateral fasciotomy sites of the right lower extremity, which utilizes multiple steel clips held by anchors that allows for continuous pressure for adequate delayed closure and reduces the use of skin grafting with an average closure of 9.6 days in comparison to 36.4 days using traditional methods. In this case study, our patient achieved complete closure of the medial fasciotomy site at day 20 and 73% advanced closure of the lateral aspect with healthy granular wound bed and smooth edges.

### History of Present Illness

33 y/o male presents to Aventura Medical Center Emergency trauma bay s/p GSW x2, GCS 14, diaphoretic with airway intact and CTA x2, pulses palpable on BUE and LLE. RLE femoral pulse palpable, dopplerable popliteal, non-palpable and non-dopplerable DP/PT. Patient was stage 4 hemorrhagic shock, 2 units of PRBCs given, >20% blood loss. 2 penetrating injuries noted on LLQ abdomen and suprapubic area. R CFA laceration, R profunda femoris laceration, R SFV laceration. Patient underwent RLE fasciotomies and revascularization of the RLE with R CFA interposition graft, ligation of RPF and SFV. Fogarty thrombectomy was performed and a large amount of clot was removed from arteries distal to the knee. Intra-operative angiogram showed a segment of Anterior tibial a. that was occluded with distal retrograde filling. TPA was injected for distal RLE perfusion and patient was started on heparin drip. Podiatric team consulted for probable ankle joint infection s/p intra-operative purulence.

### Physical Examination

- General Appearance:** Patient sedated, comfortable
- Head/Eyes:** normal conjunctiva/sclera, PERRLE
- Cardiovascular:** tachy, normal capillary refill time to bilateral UE and LLE, delayed capillary refill time to RLE, RLE cold
- Respiratory:** intubated, aerating well
- Genitourinary:** foley, urine (dark brown)
- Extremities:** femoral pulses (+2), RLE with palpable femoral, + dopplerable popliteal, non-dopplerable/palpable DP/PT, right foot cold, right foot edema, (-) passive ROM of RLE ankle and digits, (+) knee.
- Vascular Pulse Assessment:** (+) palpated: LLE PT, LLE DP; (+) doppler: RLE popliteal; (-) dopplerable: RLE PT, RLE DP
- Dermatological:** Wound vac in place to the RLE, medial and lateral fasciotomy sites covered with 250cc of light bloody drainage in canister with good seal. Digits appear gangrene, demarcating well with no SOI.
  - Removal of Wound Vac Intra-op:** R LE medial wound: 10cm x 40cm, R LE lateral wound: 14cm x 40cm down at muscle/tendon/bone

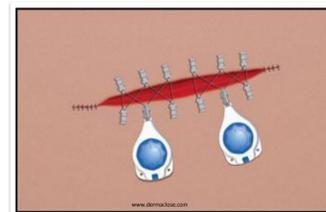
### Initial Case Presentation



### DermaClose Application



The continuous external tissue expander (DermaClose™) is a device used to facilitate rapid wound closure utilizing tension. This device automatically expands skin adjacent to a full-thickness wound facilitating delayed primary closure or significant reduction in wound size. Wounds suitable for application of this technique include, but are not limited to: noninfected foot ulcers, surgical wounds and traumatic wounds. Such an expansion method uses different tensioning devices that are often secured to the periphery of the wound by applying to the overlying skin and underlying attached structures, several cytoskeletal, extracellular, enzymatic, membrane, and cytosolic components converge to produce a biochemical response that results in an overall increase of tissue mass, known as biological creep. Mechanical creep is the relatively immediate increase in length of the same mass of tissue, whereas biological creep is the increase in tissue mass that is a direct response to a stretch stimulus.



### DermaClose Removal



KCI GraftJacket, allograft acellular dermal matrix was applied to the distal and proximal wound borders to aid in the process post-DermaClose removal.

### Patient Follow-up



- Extremities:** femoral pulses (+2), RLE with palpable femoral, + dopplerable popliteal, + dopplerable DP/PT, right foot warm, right foot edema improving, non-pitting, no tenderness (-) passive ROM of RLE ankle and digits, (+) knee, sensation to distal digits diminished at tufts
- Vascular Pulse Assessment:** (+) palpated: LLE PT, LLE DP; (+) doppler: RLE popliteal; (+) dopplerable: RLE PT, RLE DP
- Dermatological:** R LE medial wound: 7cm x 4cm, R LE lateral wound: well coapted, no drainage.

### Conclusion

Application of continuous external tissue expander (DermaClose™) was applied to both medial and lateral fasciotomy sites of the right lower extremity, which utilizes multiple steel clips held by anchors that allows for continuous pressure for adequate delayed closure and reduces the use of skin grafting with an average closure of 9.6 days in comparison to 36.4 days using traditional methods. In this case study, our patient achieved complete closure of the medial fasciotomy site at day 20 and 73% advanced closure of the lateral aspect with healthy granular wound bed and smooth edge. This study hopes to relay that the popular wound vac is not the only option for wound closure and other options such as the DermaClose system should be considered for wounds that otherwise would seem difficult to manage in the acute/subacute setting.

### References

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