Soft Tissue Reconstruction and Salvage of Infected Fixation Hardware in Lower Extremity Trauma

Presenter: Hyuma A. Leland, MD

Co-Authors: Karen Burtt, BS; Daniel J. Gould, MD, PhD; Beina Azadgoli, BS; Ido Badash, MD; Geoffrey Marecek, MD; Ram Alluri, MD; Ketan M. Patel, MD; Joseph Nicholas Carey, MD

Affiliation: University of Southern California, LA, CA

INTRODUCTION: Management of tibial fractures can be complicated by infection of internal fixation hardware, resulting in increased morbidity and amputation rate. When removal of infected internal hardware with external fixation is not possible, salvage of the lower extremity is attempted through debridement, antibiotics, and soft tissue coverage. The purpose of this study is to investigate salvage of lower extremities with retention of infected fixation hardware.

METHODS: Tibial fractures requiring soft tissue reconstruction at a level I trauma center were reviewed from 2007–2015. Demographics, outcomes, and bacterial speciation were analyzed. The primary outcome was clinical suppression of infection, while secondary outcomes included limb salvage, hardware removal, amputation, and osseous union.

RESULTS: Twenty-five patients underwent soft tissue reconstruction for salvage of infected internal fixation hardware. Average age was 41, 76% male, BMI 30.1 kg/m2, 40% of patients smoked, 96% of injuries were blunt. Tibial fractures were closed in 32%, Gustilo-Anderson grade I in 4%, II in 32%, IIIb in 20%, and IIIc in 4%. Staphylococcus was most commonly cultured with 44% methicillin-resistance. Soft tissue reconstruction was performed by local flap in 60% (73% gastrocnemius, 27% soleus), free flap in 40% (30% latissimus, 40% gracilis, 30% ALT). At 16.1 months, 76% of hardware salvage patients demonstrated clinical suppression of the infection, 57.9% rate of bony union, and 96% rate of limb salvage. One patient was amputated for recurrent infection.

CONCLUSION: Following complex, infected tibial fractures, we demonstrate a 76% clinical rate of suppression of infected hardware, and 96% success in limb salvage.

The Efficacy of Negative Pressure Wound Therapy and Antibiotic Beads as Infection Prophylaxis in Post-Traumatic Lower Extremity Salvage

Presenter: Ido Badash, BA

Co-Authors: Karen Burtt, BS; Hyuma A. Leland, MD; Daniel J. Gould, MD, PhD; Alexis D. Rounds, BS; Jennifer S. Kim, B.A; Ketan M. Patel, MD; Joseph N. Carey, MD

Affiliation: University of Southern California, Los Angeles, CA

INTRODUCTION: This study compares outcomes in trauma patients receiving negative pressure wound therapy (NPWT), antibiotic beads, or both treatments prior to soft tissue reconstruction of the lower extremity.

METHODS: This is retrospective review of patients requiring soft tissue reconstruction following traumatic lower extremity open fractures in an urban Level 1 trauma center between August 2007 and March 2015. Patients with infection prior to NPWT and/or antibiotic bead application were excluded.

RESULTS: In 72 trauma patients with 73 extremities having open fractures and subsequent lower limb vascularized soft tissue reconstruction, 26 received only NPWT, 24 only antibiotic beads, 2 neither treatment and 23 both treatments. There was no significant difference in time from injury to definitive soft tissue coverage, time from injury to NPWT/bead placement, or length of NPWT/beads use between groups. Infection rate was 26.9% with NPWT only, 0.0% with antibiotic beads only, 50.0% with neither treatment, and 8.7% with antibiotic beads and NPWT in combination. Patients receiving antibiotic beads alone were significantly less likely to develop an infection or complication as those receiving NPWT alone ($p<0.01$, $p<0.01$) or combined NPWT/beads ($p<0.01$, $p<0.01$).

Development of infection was associated with longer periods from initiation of NPWT use to definitive soft tissue coverage ($p<0.01$); this finding was independent of time from injury to soft tissue coverage but correlated with number of operations. Limb salvage rate was 95.9% and 50.0% of patient could ambulate without an assistance device 3 or more months out of surgery.

CONCLUSION: Antibiotic beads may be more effective than negative pressure wound therapy in preventing infections in patients awaiting soft tissue coverage of wounds. Utilizing these treatments together does not improve infection rates. Limb salvage was successful in most cases regardless of treatment.

The Use of Negative Pressure Wound Therapy in Skin-Containing Free Tissue Transfer

Presenter: Mija Khan, MD

Co-Authors: Ivo A. Pestana, MD; Hongda Bi, MD; Junhui Li, MD, PhD

Affiliation: Wake Forest Baptist Medical Center, Winston Salem, NC

INTRODUCTION: Initially introduced for wound management, the benefits of negative pressure wound therapy (NPWT) have stimulated the investigation of its use in new clinical scenarios.[1] Most recently, incisional NPWT has been shown to be beneficial.[2] Incisional NPWT applied to skin containing free tissue transfer has not been well defined.[3] This may originate from concerns of dressing material obscuring frequent examination of the newly transferred tissue or risk of pedicle compression and potential for increased risk of tissue loss. Our aim is to describe NPWT in fasciocutaneous free tissue transfer.

METHODS: An IRB-approved retrospective review of consecutive free tissue transfer patients was completed over a 3-year period. After fixation of the free flap, one or two drains were inserted in the sub-flap position. The surface of the flap was protected with vaseline gauze followed by a layer of sterile cotton. The V.A.C.® (KCI, Texas, USA) was applied and NPWT was initiated at -125 mm Hg. A window was routinely made over the flap's distal region to allow for serial flap examination. For extremity procedures, no splints were utilized. NPWT was employed continuously for 7 days and subsequently removed along with operative drains.

RESULTS: A total of 24 consecutive patients underwent fasciocutaneous free tissue transfer with a mean follow-up of 8.1 months. The average patient age was 39.8 years with mean BMI of 23. Tobacco use was noted in 58% of patients. The indications for the free tissue transfer included trauma, malignancy, and burn reconstruction. The areas of reconstruction included scalp, lower extremity, and upper extremity. Free flaps employed consisted of latissimus dorsi myocutaneous, anterolateral thigh, thoracodorsal artery perforator, and radial forearm free flap. The average defect size reconstructed was 238.3 cm2 with a mean operative time of 501 minutes. Postoperatively, patients remained in the hospital an average of 15.5 days. No hematomas, seromas, surgical site infections, or DVT/ PE occurred in the series. None of the flaps required return to the OR. There were no documented cases with partial or complete flap loss.

CONCLUSION: NPWT may be employed in a fashion similar to standard incisional application. With this technique, serial flap examination remains possible and is not associated with pedicle compression or increased rates of flap loss.

Reference Citations:

1. A Anghel EL, Kim PJ. Negative-pressure wound therapy: a comprehensive review of the evidence. Plastic and Reconstructive Surgery. 2016;138(3S):129S-137S.

2. A Stannard JP, Volgas DA, McGwin G 3rd, et al. Incisional negative pressure wound therapy after high-risk lower extremity fractures. J Orthop Trauma 2012;26:37a€"42.

3. A Yu P, Yu N, Yang X, Jin X, Lu H, Qi Z. Clinical Efficacy and Safety of Negative-Pressure Wound Therapy on Flaps: A Systematic Review. Journal of Reconstructive Microsurgery. 2017;33(05):358–366.

Panniculectomy Outcomes in Patients with End Stage Renal Disease

Presenter: Leela S. Mundra, BA

Co-Authors: Gustavo A. Rubio, MD; Husain T. AlQattan, MD; Seth R. Thaller, MD, DMD