Cowley Shock Trauma Center from 2015 to 2017. Patients with fractures secondary to penetrating trauma were excluded. Craniomaxillofacial CT Scans were reviewed to identify fracture patterns. Visual status was abstracted from formal ophthalmologic examination at the time of presentation. Multivariable regression was performed to identify patterns predictive of TON.

RESULTS: Six hundred patients met inclusion criteria. Thirty-seven of the 600 patients (6.2%) were diagnosed with TON. Fracture patterns most predictive of TON were: (1) sphenotemporal buttress fractures (OR = 5.8, p < 0.05) (2) naso-orbito-ethmoid (NOE) fractures (OR = 5.5, p < 0.05), (3) Lefort III fractures (OR = 3.8, p < 0.05), and (4) zygomaticomaxillary complex fractures (OR = 2.8, p < 0.05). Pure (rim-sparing) orbital fractures were less frequently associated with TON (OR = 0.5, p < 0.05) than rim-involving orbital fractures. The majority (63%) of patients who developed TON from pure orbital (rim-sparing) fractures had two wall fractures involving the floor and medial orbital wall.

CONCLUSIONS: Patients who sustain sphenotemporal buttress, NOE or Lefort III fractures are at highest risk for traumatic optic neuropathy. Surgeons treating these injuries should have heightened awareness of TON and seek ophthalmologic guidance accordingly to afford the greatest chance of visual preservation.

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Potential Virulence of MRSA and Enterococcus in Patients Undergoing Free Tissue Transfer for Chronic, Non-healing Lower Extremity Wounds

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PURPOSE: Chronic wounds in the lower extremity (LE) often fail to heal, necessitating free tissue transfer (FTT) for limb salvage. Patients in whom microsurgical LE reconstruction is indicated are often highly comorbid and prone to infection. In LE free flap studies, Hashimoto et al.¹ and Corten et al.² reported common wound colonization with *Staphylococcus* and *Enterococcus*, findings similar to those within patients of our tertiary-care center. While larger studies have investigated the microsurgical significance of *Staphylococcus*, few, if any, have investigated *Enterococcus*. The purpose of this study was to investigate the potential virulence of bacterial colonization on microsurgical limb-salvage outcomes.

METHODS: Between April 2011 and May 2018, 140 LE FTT procedures were performed by the corresponding author for reconstruction of chronic wounds. The average patient age was 54.2yrs, the average BMI 29, and 50.3% of patients had diabetes. An average of 2.65 wound-bed debridements were performed per patient prior to FTT. Deep, intra-operative qualitative tissue cultures were obtained. Average follow-up after FTT was 17 months. Using multivariate analysis we studied the implications of wound colonization with Methicillin-resistant *Staphylococcus aureus* (MRSA) or *Enterococcus* on microsurgical success and limb-status after closure was attempted via FTT.

RESULTS: Overall microsurgical success and limb-salvage rates were 91.4% (128/140) and 85% (119/140), respectively. Flaps contaminated with *Enterococcus* at the time of surgery were at increased risk for failure (OR6.21, p = 0.05). In addition, risk for flap infection was greater in patients with wounds contaminated with *Enterococcus* during preoperative debridement (OR4.3; 95%CI, 1.518–11.997; p = 0.006). Major amputation risk was increased in patients with wounds previously contaminated with MRSA (OR9.08; 95%CI, 2.721–30.320; p = 0.0003), patients with positive *Enterococcus* cultures at the time of surgery (OR6.4; 95%CI, 1.21–34.43; p = 0.03), and patients who developed flap infection with *Enterococcus* (OR19.7; 95%CI, 1.9–199.5; p = 0.01).

CONCLUSION: FTT can salvage the limb that has otherwise failed all other attempts at wound closure, obviating the need for major amputation. However, the medical demographics of this patient population and technical complexity of FTT make microsurgical outcomes vulnerable to many factors. Thus, part of restoring limb function in these patients is optimizing patient condition by mitigating perioperative risk factors. The negative impact of colonization of chronic wounds with bacteria, including MRSA, has been described. However, studies placing primary focus on individual pathogens in this population are lacking. Our results indicate potential adverse outcomes associated with noninfectious MRSA and *Enterococcus* colonization of chronic leg wounds. With
this information, microsurgeons could stratify patients by infectious etiology for risk of adverse events, potentially allowing for earlier, mitigating treatment in the preoperative course.

CITATIONS

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2. Corten K, Struelens B, Evans B, Graham E, Bourne RB, MacDonald SJ. Gastrocnemius flap reconstruction of soft-tissue defects following infected total knee replacement. *Bone Jt J*. 2013. doi:10.1302/0301-620X.95B9.129

Molecular and Genetic Characterization of Functional Schwann-Cell Like Cells (iMDSCs) Transformed from Muscle Derived Stem Cells

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PURPOSE: Current microsurgical techniques do not address the atrophy and loss of Schwann cells (SCs) after peripheral nerve trauma. SCs are the principal glial cells that are known to facilitate axonal regeneration through cytokine signaling and spatial cues for directed axonal sprouting. To enhance peripheral nerve regeneration, SC replacement therapies using mesenchymal stem cells transformed into SC-like phenotypes have been investigated, but a robust source of mesenchymal stem cells is yet to be identified. Our lab has previously demonstrated that muscle-derived stem cells (MDSCs) induced to express SC-like phenotypes reduce denervation muscle atrophy, improve neuromuscular re-innervation, and restore muscle function after upper extremity nerve trauma in rodents, given their myelination capabilities in vivo. This study further characterizes these MDSC-derived SC-like cells and confirms the myelination capacity of the SC-like cells through molecular and genetic profiling.

METHODS: SC-like cells were derived from GFP+ mouse MDSCs (GFP+ iMDSCs) using a glial growth factor-based induction protocol developed by our laboratory. Flow cytometry using the FACScan System and FlowJo data analysis software was used to quantify expression of well-established SC markers in the SC-like iMDSCs. The SC-like iMDSCs were then further characterized using RT-PCR and microarray pathway analyses, with mouse Schwann cells (ScienCell) serving as positive controls and uninduced MDSCs as negative controls. The 2-ΔΔCr method was used to analyze relative changes in gene expression between these cell lines.

RESULTS: Flow cytometry revealed that iMDSCs cultured in the SC transformation media for 12 days demonstrated increased expression of SC-defining marker P75 compared to uninduced MDSC controls (21.0 ± 1.6% vs. 6.63 ± 2.4%; p < 0.001). Upon a gene-cluster analysis comparing SC-like iMDSCs to mouse SCs, there were differences in the overall gene expression profiles of these two cell lines. However, microarray analysis identified the axonal guidance pathway as a top canonical pathway in both iMDSCs and mouse SCs. Unlike uninduced MDSCs, iMDSCs were found to upregulate expression of many genes (confirmed via RT-PCR) that are known to be involved in promoting myelination, such as Lgi4 (10-fold vs 2-fold; p<0.001), and Cadr4 (8-fold vs 2-fold; p<0.01). Also, iMDSCs and mouse SCs both demonstrated upregulated expression of Gldn (necessary for the formation of nodes of Ranvier; 15-fold vs 3-fold; p<0.01) and Sema3b (plays a role in growth cone guidance during neurogenesis; 25-fold vs 2-fold; p<0.001).

CONCLUSION: Schwann cell-like cells derived from MDSCs (iMDSCs) show differences in overall gene expression profiles when compared to true SCs, indicating that they are SC-like cells that express key transcription factors and proteins involved in myelination. These transcriptome and genetic changes are believed to play a role in promoting the functional capabilities of these SC-like cells.

Emotional Evaluation of Outcomes in Facial Reanimation Surgery Using Artificial Intelligence