

Rates of Skin Graft or Skin Flap Failure in Patients who have Received Osteopathic Manipulative Medicine Treatment: A Retrospective Study

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Abstract

Skin graft and flaps have become common practice in the plastic surgery specialty and have been demonstrated as safe and effective surgical procedures. The most common indications for a skin graft or flap is a third degree burn, chronic ulcer and trauma. Skin graft failure may occur for a variety of reasons, with incidence reported between 2 and 30%. There are currently no studies on the effect of osteopathic manipulative treatment (OMT) on skin graft failure. A retrospective chart review of electronic medical records for thirty three patients who underwent a skin graft or skin flap procedure from January 1, 2010 to December 31, 2015 at St. Barnabas Hospital Center was conducted. Variables which increase the likelihood of graft and flap failure such as immunodeficiency, polytrauma, substance abuse as well as flap and graft complications were collected and treatment patients were matched to controls for such variables. Twelve patients received osteopathic manipulative treatments and twenty one patients did not. None of the skin grafts or flaps failed in the patients who received OMT (p-value = 0.10) as compared to four graft or flap failures in those who did not receive OMT. We feel the lack of statistical significance is due to the low study population. The data, however, is promising and suggests a potential role for OMT in skin graft patients. This study indicates the need for further research into the effectiveness of OMT in the prevention of skin flap and graft failure.

Introduction

The surgical technique of skin grafting was initially documented in India 2500 to 3000 years ago to improve the cosmetic appearance of those who had sustained an amputation, most often after committing a crime such as adultery or theft¹. Skin grafts and flaps have become common practice within the plastic surgery specialty. Both grafts and flaps have been consistently demonstrated as safe and effective surgical procedures. The most common indication necessitating a skin graft or flap is a third degree burn requiring surgical intervention¹. Chronic ulcers, trauma and elective skin grafts and flaps are other common indications¹. Varied data on the rates of total skin graft or flap failure is present in the literature with ranges between two and thirty percent^{2,3}. The most common complication, which leads to skin graft failure, is development of a hematoma which prevents perfusion to the donor graft^{4,5}. The most common complication causing skin flap failure is necrosis of the most distal portion of the flap, most often due to mechanical forces^{6,7}. There are multiple other causes of graft and flap failure which include seroma, infection, rejection (xenograft), and instability (which is defined as mechanical shearing force)^{4,5,6}. While most failed skin grafts/flaps do not necessitate exploration and are able to heal via secondary intention, there is an increased duration of healing as well as adverse cosmetic implications^{2,3}. Additionally these complications increase duration of hospital stay, risk of infection and cost of care².

Neuromusculoskeletal medicine (NMM) is a medical specialty pursued by osteopathic physicians with extensive knowledge of anatomy, physiology and pathology⁸. Osteopathic Manipulative Treatment (OMT) is the manual treatment of a patient, it utilizes non-invasive techniques most commonly performed by NMM specialists and other osteopathic physicians. OMT is the application of manual external forces with intent to identify and treat somatic dysfunction⁹. A somatic dysfunction is defined as an "impaired or altered function of related components of the somatic (body framework) system: skeletal, arthrodial, and myofascial structures, and related vascular, lymphatic, and neural elements."¹¹ The application of osteopathic treatment is believed to improve systemic responses to injury via mechanisms such as metabolism, circulation, intestinal motility, cardiac function and pulmonary response. Local responses include improvement in venous and lymphatic drainage and decreased pain response⁷.

The current literature demonstrates positive correlations in patients who have received physiotherapy and scar massage with skin graft success⁵. Furthermore the use of osteopathic manipulative treatment has been demonstrated to improve chronic wound healing⁹. As previous success with other modes of manual techniques have demonstrated improved outcomes, further exploration into utility of this form of intervention is necessary. To date there has been no study with intention to evaluate the efficacy of OMT in the setting of patients who have received a skin graft or flap. This retrospective study will serve as a platform to demonstrate the need for more extensive research with regards to skin graft and skin flap success in those who received OMT. The intention of this study is to assist in the continued improvement of care to patients

and further establish OMT as an adjunct medical intervention with utility in the postoperative patient.
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Methods and Materials

A retrospective chart review of electronic medical records for thirty-three patients who underwent a skin graft or skin flap procedure from January 1, 2010 to December 31, 2015 at a level one trauma center in a Bronx, New York hospital was performed. A list of all postoperative patients within the plastic surgery department was compiled. All patient charts with skin graft/flap procedures completed within the above timeframe were reviewed in their entirety. Data regarding hospital stay, comorbid medical conditions, complications of graft as well as type of graft and whether it was successful was compiled for patients who had received OMT as well as for those who did not receive OMT. Rates of graft and flap failure were compared in those who received OMT to those who did not. Every attempt was made to match patients who received treatment to those who did not to control for variables. Based on this data a chi-square test was used to determine the significance of the data collected. IRB Approval (2016.71) was obtained from St. Barnabas Hospital prior to the start of data collection.

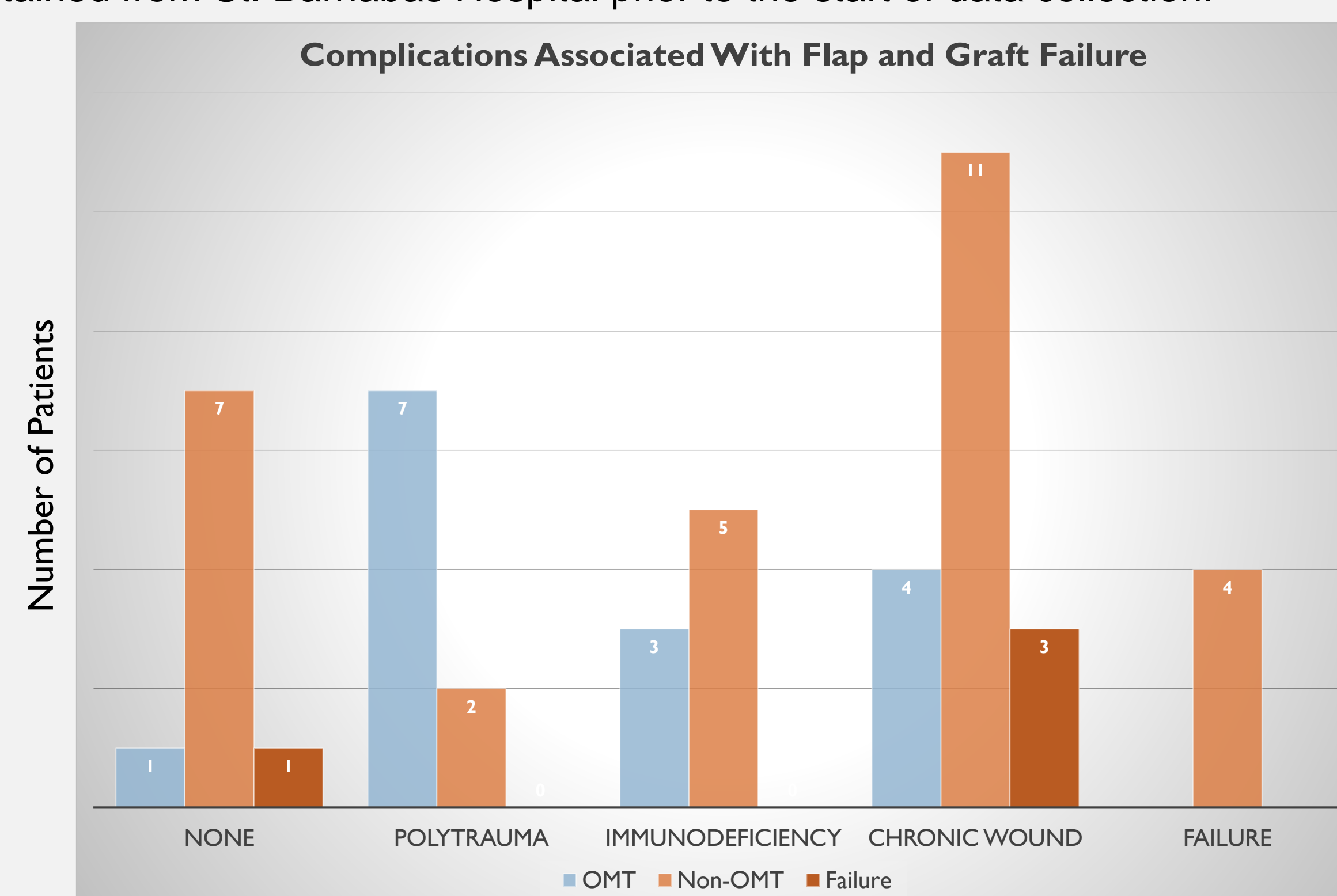


Chart 1. Rates of Complications in OMT vs. Non-OMT patients

Results

In total there were thirty three skin graft and flap procedures performed in the timeframe reviewed. The average age of the patients charts reviewed was forty three with fourteen (42%) females and nineteen (52%) males. There were twenty three split thickness skin grafts, two full thickness skin grafts and eight flaps performed in this time. Necessity of the procedure were varied and included traumatic injury (such as de-gloving or dog bite), chronic non-healing wounds, burns, as well as fasciotomy sites. Conditions affecting skin graft/flap healing (Chart 1) were absent in 27% of patients, 39% had a chronic opened wound bed, 33% of the patients smoked cigarettes additionally, 51% had some other medical condition affecting healing (HIV, diabetes, peripheral vascular disease, cancer or alcoholism). A wound VAC device was placed on twenty three (70%) of patients and there were no complications with twenty two of the grafts or flaps. The complications that did arise included necrosis (9%), instability (6.1%), contracture (6.1%) and infection (3%). Additionally, there were five patients who had some other complication of their graft/flap such as recurrence of cancer around the flap, infection distal to the graft or some combination of the above complications. The average length of hospital stay overall was twenty two days, patients receiving OMT had an average stay of twenty days. Overall there were four (one skin graft and three flaps) which failed, twenty eight which did not and one (graft) which is still being evaluated but appears likely to fail. Twelve patients received at least one osteopathic treatment during the course of their hospital stay. One patient began receiving osteopathic treatments after the graft began to show signs of failure. At this time the success of this graft is still to be determined and the data for this patient has been excluded. Of the patients receiving OMT none of the skin grafts or flaps failed (p-value = .10).

Discussion

While largely unknown, the rates of skin flap and skin graft failure varies greatly in the literature. It is important to illuminate forms of adjunctive care to prevent the failure of these procedures as there is an increased risk of infection, debilitating deformity, and prolonged limitation to functional status related to contractures and increased energy expenditures².

In the four cases of graft or flap failures, there were no patients who received OMT. Three of the failure patients had a chronic wound, adversely affecting healing. In a literature review, there are studies that show an improvement in healing times and tissue perfusion in patients for which OMT was used to augment the healing⁹. However, in the review of our data, only four of the fifteen patients with chronic wounds actually received OMT. This presents an opportunity for further research into the efficacy of OMT in patients with chronic non-healing wounds perhaps altogether avoiding a skin graft or flap surgery.

The average length of stay for a trauma patient in New York City is seven days, at St. Barnabas Hospital the average length of stay is six and a half days¹⁰. In this study the trauma patients who received OMT had an average hospital stay of twenty-five days (see Chart 2). These patients sustained significant debilitating trauma necessitating multiple surgical interventions. The severity of injury is likely related to the increased length of hospital stay. The inclusion of OMT in the management of a patient with multiple traumatic injuries indicates an acknowledgement of the value that OMT provides to the trauma surgical service. In the same breath, the trauma patients exhibited no graft/flap failures. This further speaks to the efficacy of OMT in this setting. As some of the most critically ill patients in this study, these are the patients expected to have higher rates of complications. However, this has not been shown to be true within the scope of this particular study regarding those who received OMT.

There are several limitations of this study which could be addressed with a formal prospective double blinded randomized controlled trials accounting for extraneous variables. The first limitation is the overall small sample size and the lack of even distribution between the intervention arm (OMT) and the control arm (non-OMT). This limitation could account for the lack of statistical significance. Additionally, while every attempt was made to case match patients based on medical conditions and complications that effect graft/flap healing this was not always possible. The uneven distribution of patients between the two groups may have affected the results. The uneven distribution of patients between the two groups may have affected the results. The uneven distribution of patients between the two groups may have affected the results.

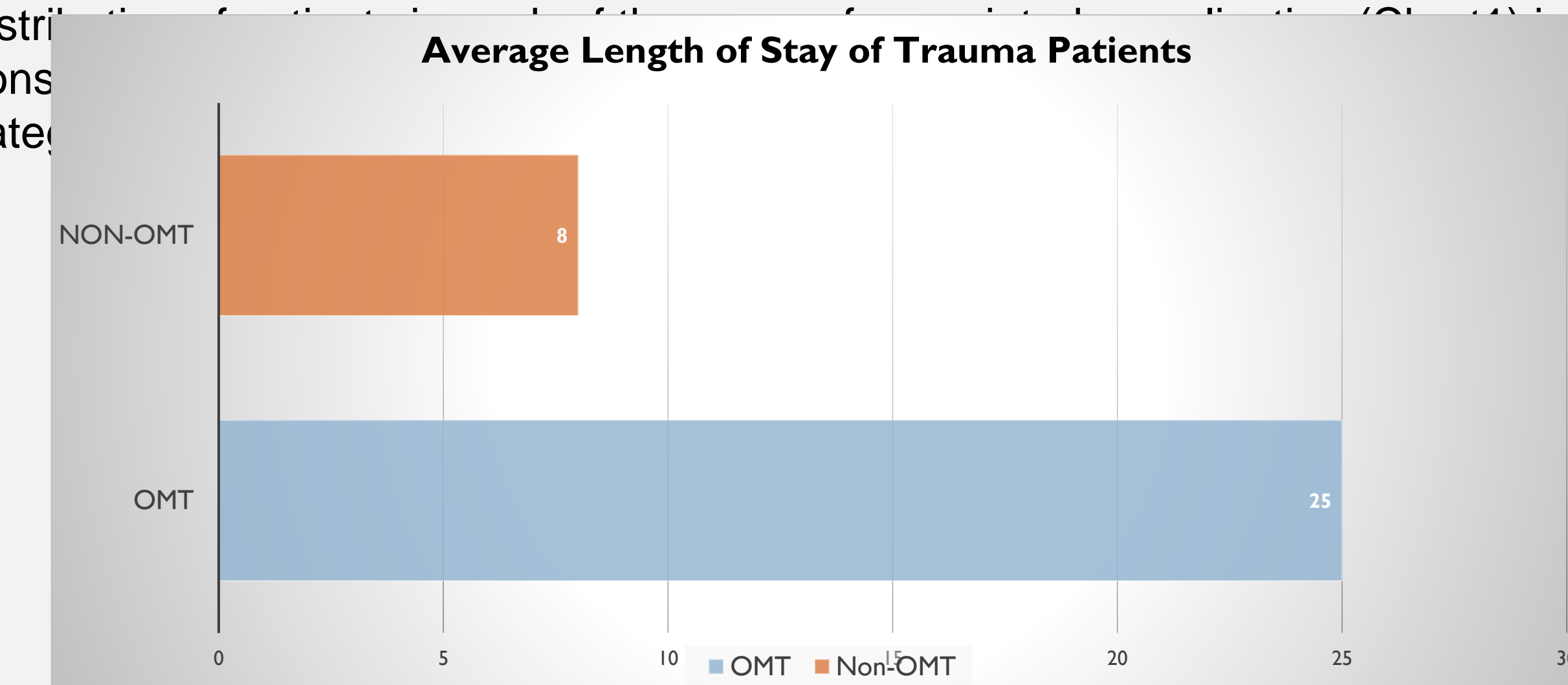


Chart 2. Average Length of Trauma Patient Hospital Stay

Conclusions

As an understudied area, the utility of adjunctive therapies, such as OMT, in the success rates of skin grafts and flaps is severely limited. However, within the patient population and data set above, analysis demonstrated no skin graft or flap failures in patients who received OMT when compared to those who did not. Despite a lack of statistical significance, most likely due to a low study group number, the patient population necessitating skin grafts and flaps continues to grow and the rates of failure are varied with a wide range of causes. This potential allows for the validity and necessity of further retrospective, as well as prospective randomized control trials on a multicenter level to further evaluate the efficacy of OMT in this setting and control for variables effecting healing.

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