International Surgery Journal
Bodden C et al. Int Surg J. 2024 Dec;11(12):2075-2078
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20243549

Case Series

Utilization of osteopathic manipulation treatment in healing of pressure ulcers

Chloe Bodden[1], Stevens Griner[1], Patrick Kiarie[2], Christina Sneed[2], Madiha Khan[3], Ayda Khan[3], Preet Sawhney[3], Seth Williams[2], Andrew Miele[4], Martine A. Louis[1]*

[1]Department of General Surgery, Flushing Hospital Medical Center, New York, USA
[2]Saint George University Medical School, Grenada
[3]New York Institute of Technology College of Osteopathic Medicine, New York, USA
[4]MediSys Health Network, Queens, New York, USA

Received: 07 September 2024
Revised: 10 October 2024
Accepted: 17 October 2024

***Correspondence:**
Dr. Martine A. Louis,
E-mail: mlouis2.flushing@jhmc.org

ABSTRACT

Pressure ulcers (PUs), caused by prolonged pressure on the skin and tissue, affect millions annually in the US, resulting in significant emotional and financial burdens for patients. The healthcare system bears a substantial cost burden annually, primarily due to stage 3 and 4 ulcers. Through noninvasive techniques, osteopathic manipulative treatment (OMT) targets lymphatic system dysfunction and homeostasis to expedite patient recovery, with documented applications in conditions such as low back pain, pneumonia, and lower extremity wounds by optimizing lymphatic flow. However, the potential of OMT in managing PUs still needs to be thoroughly explored. This pilot study involved lymphatic OMT performed three times a week on patients admitted with community-or healthcare-acquired sacral PUs present for at least one week. Ulcer growth rates were calculated based on volume at baseline and in the third week following the first manipulation. Each patient was provided descriptive comparisons of albumin levels, body mass index (BMI), and demographic data, including age, sex, and race. At week three, following the initiation of treatment, decreased ulcer volume based on growth rate was observed in 75% of patients in our OMT group compared to 25% of patients in our control group. Our OMT pilot study suggests that adding OMT to standard therapy is safe and feasible, and it may accelerate the healing rate of sacral PUs while decreasing the cost burden on the healthcare system.

Keywords: PUs, OMT, Noninvasive treatment, Healthcare cost burden, Wound management

INTRODUCTION

Pressure ulcers (PUs) are localized injuries to the skin or underlying soft tissue resulting from prolonged pressure and subsequent hypoperfusion.[1] They affect an estimated 1 to 3 million people annually in the United States (US) and are associated with substantial emotional and financial burdens on patients.[2] The load on the healthcare system is significant, with an estimated annual cost of nearly $27 billion, approximately half of which is related to stage 3 and 4 PUs.[3] Community-acquired pressure injuries (CAPI) that occur in nursing homes, rehabilitation centers, at home, or other long-term care settings may be underreported. Hospital-acquired pressure injuries (HAPI) increase nurse workload by about 50%. The prohibitive costs of caring for PUs warrant consideration of feasible, safe, and cost-effective treatments. Osteopathic medicine (OM) is an underutilized approach that could represent a valuable option, governed by four main principles: the body is viewed as a single, unified unit of body, spirit, and mind, with an innate ability to heal, regulate, and maintain

itself; structure and function are closely related; and management and treatment should integrate these concepts. OM addresses lymphatic system dysfunction and homeostasis through noninvasive techniques focusing on stimulating the body's healing processes to shorten patient recovery time. OMT have been used in conditions such as low back pain, pneumonia, paralytic ileus, and lower extremity wounds by maximizing lymphatic flow. However, the effects of OMT on PUs remain understudied.[4]

CASE SERIES

This pilot study involved lymphatic OMT performed three times a week on patients admitted with community- or healthcare-acquired sacral PUs that had been present for at least one week. Standard care for these patients included repositioning, nutrition optimization, and topical wound care. The OMT techniques, added to the standard care, included thoracic outlet release and rib raising, each conducted during ten-minute sessions three times a week (Figures 1 and 2). Patients with deep venous thrombosis, pulmonary embolism, cancer, heart failure, arrhythmias, or hemodynamic instability were excluded from this study. Demographic and clinical characteristics were recorded (Table 1). To avoid any bias from the treatment team, wound care nursing staff were responsible for taking measurements. Ulcer growth rates were calculated based on volume at baseline and in the third week following the first manipulation (Table 2). Descriptive comparisons of albumin levels, BMI, and demographic data, including age, sex, and race, were provided for each patient (Table 1). The manipulations were brief, did not add to the workload of the care team, and were not associated with any adverse events.

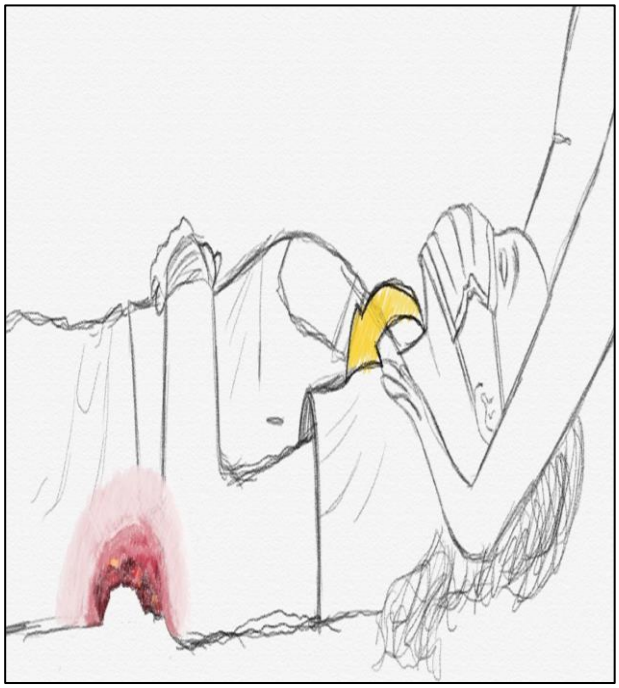

Figure 1: Illustration of thoracic outlet release.

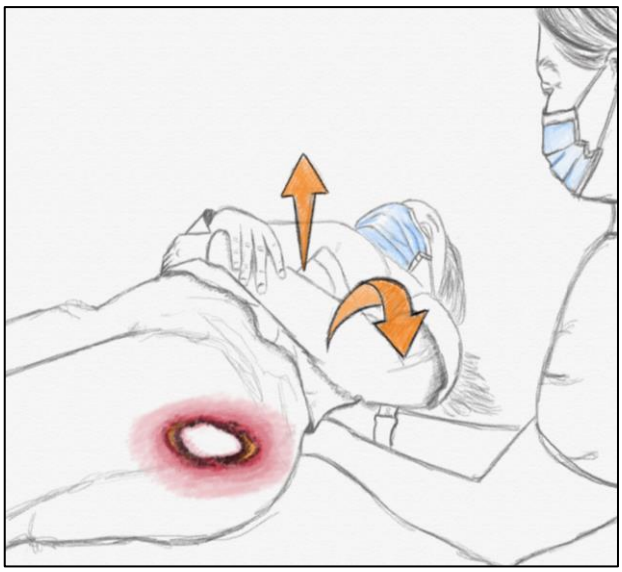

Figure 2: Illustration of rib raising.

The average age in both the treatment and control groups was 78 years. In the treatment group (n=4), 75% were female and 50% were black, compared to the control group (n=4), where 50% were female and 50% were black. The mean BMI was 28.3 in the treatment group, 27.2 in the control group, and 28.3 overall. Mean albumin levels were 3.3 in the treatment group, 2.7 in the control group, and 2.9 overall. By week three, following the initiation of treatment, a decrease in ulcer volume based on growth rate was observed in 75% of patients in the OMT group, compared to 25% in the control group. No adverse events were reported in either group. From week 2 to week 3, the median ulcer volume in the control group increased by 425%, while in the treatment group, the median ulcer volume increased by just under 100%.

Table 1: Descriptive statistics of the sample and by treatment arm.

Variables	Overall	Treatment	Control
Mean age (in years)	78	78	78
Female (%)	63	75	50
African American (%)	50	50	50
Albumin levels (g/dL)	2.9	3.3	2.7
BMI (kg/m^2)	28.3	28.3	27.2

Table 2: Mean percentage volume reduction in the treatment and control group over three weeks.

Treatment time (weeks)	Median pressure ulcer volume reduction (%)	
	Treatment	**Control**
1	113	12
2	110	20
3	220	105

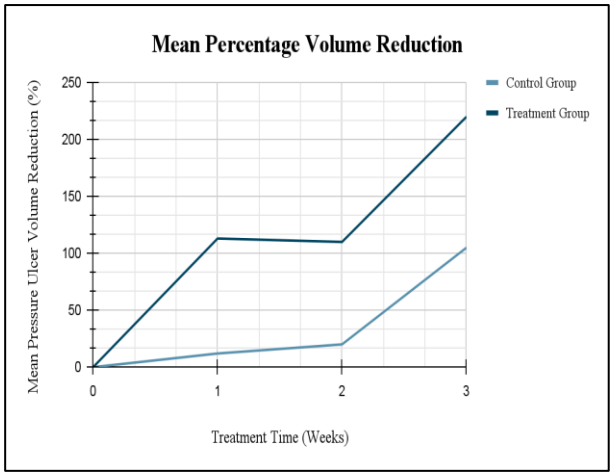

Figure 3: Mean percentage volume reduction in the treatment and control groups over three weeks.

DISCUSSION

In the US an estimated 2.5 million hospitalizations are linked to PUs. PUs represents a substantial financial burden on healthcare systems, with an annual cost of nearly $27 billion, approximately half of which is related to stage 3 and 4 PUs.[3] For non-hospitalized patients, such as those in nursing homes, rehabilitation centers, at home, or other long-term care centers, PUs are called CAPI and may be underreported. For inpatient hospitalizations, HAPI increase nurse workload by about 50%. Within hospital departments, the highest PU incidence occurs in orthopedics (18.5%), oncology (14.5%), ICU (13.7%), and neurological ICU (12.8%), with the lowest incidence in nephrology (2.6%).[1] PUs are localized injuries to the skin or underlying soft tissue secondary to prolonged pressure above a certain threshold, leading to hypoperfusion, tissue ischemia, and even necrosis.[5] They are more frequently found in the extremities (hands/arms, feet/legs) and bony protrusions (sacrum, heel). Complications of PUs include pain, infection (ranging from local to osteomyelitis and sepsis), more extended hospital stays, increased burden on patients and caregivers, depression, and even death.[1]

PUs is classified by stages, from stage 1 (intact skin with non-blanchable redness) to stage 4 (full-thickness tissue loss with exposed bone, tendon, or muscle), with additional categories for deep tissue pressure injuries (DTPI) and unstageable ulcers.[6] The most common sites for PU development include the sacrum (44%), buttocks (15%), and heel (15%).[1] Risk factors include immobility, malnutrition, advanced age, incontinence, reduced perfusion, and sensory loss. Prolonged hospitalization or immobilization and sustained sitting or lying positions contribute to PU development.[3]

Prevention of PUs typically involves healthcare professional education, risk assessment, early mobilization, and frequent repositioning.[7] The standard interval for offloading bedridden patients to prevent PUs is every 2 hours, although this can vary based on patient-specific factors.[8] Recent guidelines from the NPIAP (National pressure injury advisory panel) suggest tailoring repositioning schedules to a patient's activity level and ability to move independently.[9] Albumin levels are closely monitored in PU patients, as lower albumin concentrations are associated with greater PU risk and slower healing. Keeping albumin levels above 2.8 gm/dL has improved PU healing outcomes.[10]

OMT addresses lymphatic system dysfunction, crucial for immune response and tissue homeostasis. Dysfunction in the lymphatic system can lead to poor immune response, swelling, and tissue injury.[11] OMT techniques, such as rib raising and thoracic outlet release, improve lymphatic flow, enhance chest wall expansion, and decrease inflammation.[12] These techniques can be easily incorporated into patient care, particularly for vulnerable populations (e.g., the elderly, acutely ill, or patients with degenerative conditions).[12] Previous studies have demonstrated the benefits of OMT in conditions like pneumonia, lower extremity wounds, and scars, but further research is needed to assess its utility in PU management.[14-16]

Limitations

While our study has limitations due to the small sample size, it represents an essential exploration of the potential benefits of OMT as an adjunct therapy for PUs. The small sample allowed for a focused assessment of safety, feasibility, and preliminary efficacy, providing a foundation for larger-scale studies. Despite these limitations, the insights gained from this pilot study support the potential for OMT integration into clinical practice for PU management.

CONCLUSION

As hospitals invest in quality improvement initiatives to prevent and manage PUs, osteopathic manipulation (OM) may represent a valuable addition to standard care. Our pilot study suggests that incorporating OMT into PU treatment is safe, feasible, and may accelerate healing while potentially reducing healthcare costs. Training healthcare staff and caregivers to administer OMT could enhance patient outcomes, particularly in long-term care settings. Future research with larger sample sizes is needed to explore OMT's full potential in PU prevention and treatment, patient satisfaction, and long-term outcomes.

ACKNOWLEDGMENTS

Authors would like to thank to Himanshoo Rao and Saeed Yasin for their valuable contributions to this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Afzali BL, Albatineh AN, Hasanpour DA, Ghanei GR. The Incidence of Pressure Ulcers and its Associations in Different Wards of the Hospital: A Systematic Review and Meta-Analysis. Int J Prev Med. 2020;11:171.
2. Mervis JS, Phillips TJ. Pressure ulcers: Pathophysiology, epidemiology, risk factors, and presentation. J Am Acad Dermatol. 2019;81(4):881-90.
3. Gould LJ, Alderden J, Aslam R, Barbul A, Bogie KM, El Masry M, et al. WHS guidelines for the treatment of pressure ulcers-2023 update. Wound Repair Regen. 2023;32(1):6-33.
4. Anglund DC, Channell MK. Contribution of osteopathic medicine to care of patients with chronic wounds. J Am Osteopath Assoc. 2011;111(9):538-42.
5. Worsley PR, Crielaard H, Oomens CWJ, Bader DL. An evaluation of dermal microcirculatory occlusion under repeated mechanical loads: Implication of lymphatic impairment in pressure ulcers. Microcirculation. 2020;27(7):e12645.
6. Chen Z, Gleason LJ, Sanghavi P. Accuracy of Pressure Ulcer Events in US Nursing Home Ratings. Med Care. 2022;60(10):775-83.
7. Gaspar S, Peralta M, Marques A, Budri A, Gaspar de Matos M. Effectiveness on hospital-acquired pressure ulcers prevention: a systematic review. Int Wound J. 2019;16(5):1087-102.
8. National Clinical Guideline Centre (UK). The Prevention and Management of Pressure Ulcers in Primary and Secondary Care. London: National Institute for Health and Care Excellence (NICE). (NICE Clinical Guidelines, No. 179.). 2014.
9. Gillespie BM, Walker RM, Latimer SL, Thalib L, Whitty JA, McInnes E, et al. Repositioning for pressure injury prevention in adults. Cochrane Database Syst Rev. 2020;6(6):CD009958.
10. Serra R, Grande R, Buffone G, Gallelli L, Caroleo S, Tropea F, et al. Albumin administration prevents the onset of pressure ulcers in intensive care unit patients. Int Wound J. 2015;12(4):432-5.
11. Roberts A, Harris K, Outen B, Bukvic A, Smith B, Schultz A, et al. Osteopathic Manipulative Medicine: A Brief Review of the Hands-On Treatment Approaches and Their Therapeutic Uses. Medicines (Basel). 2022;9(5):33.
12. Flodine TE, Thomas M. Osteopathic Manipulative Treatment: Inhaled Rib Dysfunction. Treasure Island (FL): StatPearls Publishing. 2023.
13. Lancaster DG, Crow WT. Osteopathic Manipulative Treatment of a 26-Year-Old Woman with Bell's Palsy. J Am Osteopathic Assoc. 2006;106(5):285-9.
14. Goldstein M. Osteopathic manipulative treatment for pneumonia. Osteopath Med Prim Care. 2010;4(1):3.
15. Kilgore T, Malia M, Di Giacinto B, Minter S, Samies J. Adjuvant Lymphatic Osteopathic Manipulative Treatment in Patients With Lower-Extremity Ulcers: Effects on Wound Healing and Edema. J Am Osteopath Assoc. 2018;118(12):798-805.
16. Riquet D, Houel N, Bodnar JL. Effect of osteopathic treatment on a scar assessed by thermal infrared camera, pilot study. Complement Ther Med. 2019;45:130-5.
17. Lennon RP, Dong H, Zgierska AE, Demetriou T, Croad J, Livelsberger C, et al. Adjunctive osteopathic therapy for hospitalized COVID-19 patients: A feasibility-oriented chart review study with matched controls. Int J Osteopath Med. 2022;44:3-8.
18. Bowes MR, Speicher MR, Tran LT, Santiago PN. Osteopathic Manipulative Medicine and Its Role in Psychiatry. Cureus. 2023;15(10):e47045.
19. Sen CK. Human Wounds and Its Burden: An Updated Compendium of Estimates. Adv Wound Care (New Rochelle). 2019;8(2):39-48.

Cite this article as: Bodden C, Griner S, Kiarie P, Sneed C, Khan M, Khan A, et al. Utilization of osteopathic manipulation treatment in healing of pressure ulcers. Int Surg J 2024;11:2075-8.