Pan-African Journal of Plastic Reconstructive and Aesthetic Surgery Vol. 2 No. 2 June 2025

SCIENTIFIC COMMUNICATION:

FECAL MICROBIOTA TRANSPLANT: A PRIME PLASTIC SURGEON'S WEAPON IN ENDORSING WOUND HEALING.

SUMMARY

Successful outcomes following plastic surgery procedures rest on infection control, wound healing as well as scar reduction. The goal of Fecal Microbiota Transplantation (FMT), a novel therapeutic strategy, is to reestablish the recipient's gut microbiota by transferring stool from a healthy donor to the patient. FMT has drawn attention in a number of spheres, including dermatology and surgery, despite its historical use in treating Clostridium difficile infections (CDI). Appreciating the role of gut microbiota in infection deterrence, scarring as well as wound healing, may aid plastic surgeons improve surgical results. The current paper surveys the potential uses of FMT in plastic surgery, with emphasis on how it might improve wound care and patient recovery.

INTRODUCTION

Successful outcomes following plastic surgery procedures rest on infection control, wound healing as well as scar reduction. Scrutinizing how treatments like FMT could enhance plastic surgery outcome is indispensable as progressively more research makes known the gut microbiota's role in immune response, systemic inflammation as well as quality of the skin. Although research on the use of FMT to affect surgical outcomes is still in its primary stages, there is evidence that the gut-skin axis may be central in enhancing patient outcomes.

In the perioperative phase, these gut microflorae play a fundamental role in controlling immune responses, guarding against infections as well as preserving the integrity of the gut barrier. The gut microbiota has been linked to the regulation of skin disorders e.g., psoriasis, as well as wound healing, demonstrating its impact beyond gastrointestinal health (Neish, 2020).

Various authorities have indicated that systemic inflammation, in addition to compromised immune function, could result from dysbiosis. Given that surgical patients frequently struggle with wound care and eventual scarring, this concept of gut microflorae is especially crucial for plastic surgeons in the context of wound healing in addition to infection prevention. By using FMT to restore gut microbiota, it may be possible to lower inflammation and improve healing.

FMT and its Mechanisms of action

Fecal material from a healthy donor is transferred into the recipient's digestive system during FMT, thereby reestablishing microbial diversity and balance. This could be done through colonoscopy, enema, or oral capsules. By restoring microbial diversity and balance, this course seeks to improve immune function besides decreasing inflammation, among other systemic effects.

Through the gut-skin axis, the gut microbiota influences the skin quality by way of immunomodulation as well as control of inflammatory pathways. The idea of manipulating this axis through FMT may hold promise for plastic surgeons dealing with complex wounds, chronic inflammation, and poor tissue regeneration in patients with compromised immune function.

Implications for Plastic Surgery

In addition to aesthetic surgeries such as facelifts and rhinoplasty, plastic surgery includes a variety of procedures e.g., reconstructive surgery for malignancies, burns, trauma, as well as congenital deformities. It is imperative to note that each of these procedures exerts stress on the immune system, thereby necessitating optimal conditions for healing as well as minimal risk of infection.

Dysbiosis has been associated with subpar wound healing results. Effective control of systemic inflammation and immune response depends on a balanced gut microbiome. A patient's capacity to recover from surgery may be improved if FMT is applied prior to surgery to promote gut health. Some gut microbiome bacterial strains, like Lactobacillus and Bifidobacterium, have been linked to improved wound healing by modifying inflammatory cytokines.

Inflammation control is crucial in ensuring appropriate wound healing and avoidance of excessive scarring. Hypertrophic scarring, keloids formation, chronic wounds, as well as poor scar quality can all result from dysregulated inflammation. Research has indicated taht FMT can lower systemic inflammation by strengthening the integrity of the gut barrier and encouraging the growth of bacteria that fight inflammation, like Faecalibacterium prausnitzii (Kuroda *et al.*, 2015). This bacterium may help reduce excessive inflammation post-surgery as it produces butyrate, a SCFA with anti-inflammatory qualities.

Furthermore, immune modulation via FMT may improve wound healing by stimulating the activity of regulatory T cells (Tregs), which are essential for wound healing and immune tolerance. By promoting tissue repair and reducing systemic inflammation through Treg activation, a healthy gut microbiota may improve outcomes for patients undergoing plastic surgery, according to research by Poutahidis *et al*. (2013).

Additionally, scarring, predominantly in cosmetic procedures where the least amount of scarring is preferred, remains one of the key nightmares of a plastic surgeon. Research has shown that collagen synthesis and fibroblast activity, the two fundamental processes essential for scar formation, can be influenced by gut microbiota. In patients who are at risk of scarring, FMT may be able to curtail hypertrophic or keloid scars by lowering systemic inflammation. Supplementary investigation into the specific bacterial strains influencing collagen synthesis may lead to new developments in plastic surgery adjunct therapies.

Additionally, surgical site infections (SSIs) remain a frequent side effect, especially when implants are used or extensive tissue manipulation is done. Through endorsing the development of beneficial bacteria that outcompete dangerous pathogens, FMT has shown promise in lowering SSIs. For example, short-chain fatty acids (SCFAs), which have anti-inflammatory and antimicrobial qualities, are produced by Bacteroides species in the gut and may, in theory, lower the risk of infections after surgery (Poutahidis *et al*., 2013). Therefore, preoperative FMT administration to high-risk patients may be a tactic to reduce SSI rates in plastic surgery El-Salhy *et al*., 2021.

To lower postoperative infection rates, for instance, restoring microbial balance through FMT may be a useful tactic for immunocompromised patients, such as those having reconstructive surgery following trauma or cancer treatment. The possible benefits of improved immune protection are worth investigating, even though there is paucity of clinical studies that directly connect FMT to lower SSI rates in surgical patients.

Challenges and Future Directions

Despite the apparent theoretical advantages of FMT in plastic surgery, there remains myriads of obstacles to its actual application. The safety and effectiveness of FMT in the surgical population must first be established through exhaustive clinical trials. Additionally, in order to thwart negative consequences like the spread of infections, standardization of donor screening and stool preparation procedures is crucial. The creation of synthetic microbiota is a promising field for further study since it would enable more individualized and controlled transplants.

Since FMT is still largely regarded as experimental in many parts of the globe, we caution that plastic surgeons should also be aware of its ethical as well as legal implications. Nevertheless, working together, plastic surgeons, gastroenterologists, and microbiologists will be able to fully utilize FMT in surgical practice.

CONCLUSION

Integrating developments from other medical specialties can improve patient outcomes as plastic surgery develops further. Infection prevention, immune system regulation as well as wound healing functions of the gut microbiota present new-fangled opportunities to enhance surgical patients' convalescence. The potential for FMT as a therapeutic adjunct for plastic surgery that maximizes wound healing and minimizes scarring is still in its early stages. In order to integrate FMT into customized surgical treatment, future research should focus on pinpointing the specific microbial strains that influence surgical results (El-Salhy *et al.*, 2021).

REFERENCES

1. Neish, A. S. (2020). Microbes in gastrointestinal health and disease. *Gastroenterology*, 139(5), 1813-1820.
2. Youngster, I., *et al.* (2014). Fecal microbiota transplant for relapsing Clostridium difficile infection. *JAMA*, 312(17), 1772-1778.
3. Bowe, W., & Patel, N. B. (2017). The gut-skin axis: Implications for the role of probiotics in treating skin disorders. *Dermatologic Therapy*, 30(3), e12466.
4. Poutahidis, T., *et al.* (2013). Beneficial bacteria trigger gut and systemic immune system modulations and effects on skin health. *Gut Microbes*, 4(1), 44-49.
5. Kuroda, K., *et al.* (2015). The role of fibroblasts in hypertrophic scarring. *Plastic and Reconstructive Surgery*, 136(4), 667-676.
6. McDonald, D., *et al.* (2018). American Gut: An open platform for citizen science microbiome research. *mSystems*, 3(3), e00031-18.
7. El-Salhy, M., *et al*. (2021). Gut microbiota and its role in the pathogenesis and treatment of irritable bowel syndrome. *Gastroenterology Clinics of North America*, 50(3), 391-406.

Authors: Adegu William, University of Nairobi, department of plastic, reconstructive and aesthetic surgery, **Benjamin Wabwire**, Kenyatta National Hospital, **Protus Kituyi**, Moi University, department of surgery and anesthesiology, **Stanley Khainga,** Moi University, department of surgery and anesthesiology and **Ferdinand Nang'ole,** University of Nairobi, department of plastic, reconstructive and aesthetic surgery.

Corresponding Author: Dr. Adegu William, University of Nairobi, department of plastic, reconstructive and aesthetic surgery, P. O. Box 1663-50100, Kakamega, Kenya. Email address: jacobadegu@yahoo.com.