



OVERVIEW OF WOUND CARE AND MANAGEMENT

Rakan Nizar Wizza^{1*}, Noura Mohammed Bakhsh², Abdullah Faisal Alharthi³, Moayad Mohammed Tayeb⁴, Zahid Mohammed Bugis⁵, Hassan Majed Sagga⁶

^{1*,2,3,4,5,6}Ajyad Emergency Hospital - Makkah Healthcare Cluster – Saudi Arabia

***Corresponding Author:** Rakan Nizar Wizza

^{*}Ajyad Emergency Hospital - Makkah Healthcare Cluster – Saudi Arabia

Abstract:

Post-operative wound care is paramount in preventing infections and complications that may arise post-surgery. The emphasis is placed on the crucial aspect of conducting timely evaluations of the wound, ensuring a thorough cleansing process, applying suitable dressings, and promptly identifying any potential signs of complications that may develop. A specialized solution has been introduced, incorporating plant extracts and specific ingredients designed to facilitate wound healing and act as a preventive measure against infections. Within plastic surgery, the management of scars is underscored as a crucial element in enhancing the visual aesthetics of patients and contributing to their emotional well-being. The continuous advancements in plastic surgery techniques are geared towards minimizing the visibility of scars, thus reducing any associated social stigma and ultimately improving patients' overall quality of life.

Keywords: Wound – Scare – Surgical site infection (SSI) – Care – management.

Introduction:

Post-operative wound care is vital in preventing surgical site infections and wound dehiscence, which can significantly impact the healing process and overall patient well-being. This includes the essential steps of timely wound assessment, ensuring thorough cleansing, applying appropriate dressings, and promptly identifying any signs of complications that may arise post-surgery. To enhance the postoperative care process, a specialized solution has been created utilizing plant extracts and specific ingredients designed to not only support the healing of the wound but also to actively deter infections from taking hold and causing further problems for the patient. By incorporating this innovative approach into post-surgical wound management, healthcare providers can potentially improve outcomes and reduce the risk of complications, ultimately benefiting the recovery journey of individuals undergoing surgical procedures (Figure 1).[1,2]

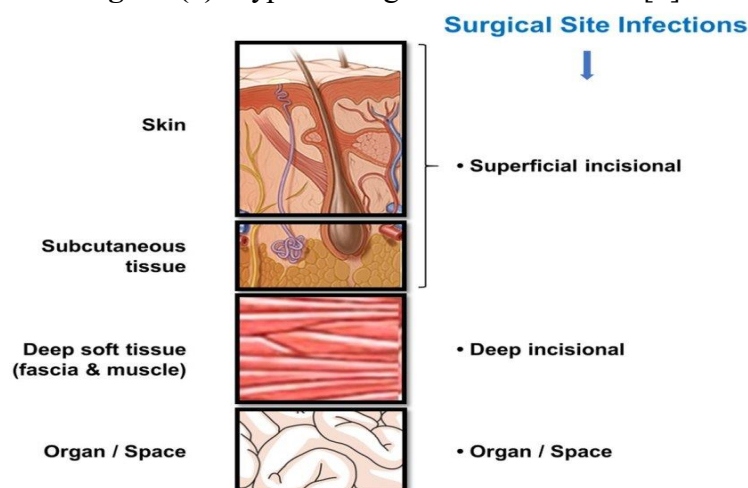
Plastic surgery plays a vital role in the management of scars, with the primary goal of enhancing both the visual appeal and the emotional well-being of individuals who have undergone trauma. Various research studies have indicated that the continuous improvement of plastic surgery procedures can effectively address facial scars resulting from injuries, leading to outcomes that are not only satisfactory but also accompanied by minimal localized symptoms. Moreover, the realm of plastic surgery presents a significant opportunity for decreasing the social stigma attached to scars caused by self-inflicted injuries, thereby contributing to an improvement in the overall quality of life for patients and expanding their options in terms of clothing selections. It is worth noting that the perspectives of surgeons regarding scar aesthetics can differ depending on their areas of specialization, with plastic

surgeons and obstetricians typically assigning the highest importance to this aspect, underscoring the necessity of ensuring alignment between the preferences of patients and healthcare providers to achieve the best possible results. Furthermore, the ongoing advancements in techniques for treating scars, including topical treatments featuring active components and the integration of dermal substitutes, have exhibited considerable potential in delivering nearly imperceptible scars in cosmetic and reconstructive surgical procedures.[3]

Surgical site infections (SSIs):

SSIs refer to infections that affect the skin or underlying soft tissues at the surgery site, manifesting within 30 days after the surgical operation where the incision was primarily closed. The Centers for Disease Control and Prevention (CDC) classifies these infections into three categories: superficial incisional, deep incisional, and organ/space SSIs. Superficial incisional infections involve the outer layers of the skin, deep incisional infections affect the deeper tissues, and organ/space SSIs involve organs or anatomical spaces manipulated during the surgery.[4] Superficial incisional SSI occurs within 30 days of the procedure when a patient presents with specific indicators such as the presence of pus in the superficial incision, identification of microorganisms through sterile culturing of fluid or tissue from the incisional drainage, as well as the manifestation of infection-related signs like pain, localized swelling, redness, and tenderness; it is crucial for a surgeon or attending physician to confirm the diagnosis of superficial incisional SSI. Deep incisional SSI, which involves infection in the deep soft tissues (fascial and muscle layers) within one to three months post-surgery, is characterized by purulent drainage, specifically from deep incisions rather than the organ/space part of the surgical site. Additionally, this type of SSI is identified when a deep incision either suddenly opens up or is intentionally opened by a surgeon and is found to be either culture-positive or not cultured. Patients with deep incisional SSI typically exhibit signs such as fever ($>38^{\circ}\text{C}$), localized pain (except in cases where the site is culture-negative), and evidence of infection like an abscess within the deep incision site, which can be detected through clinical examination, a second surgery, or radiological and histopathologic assessment. Organ/Space SSI Infection typically manifests within a period ranging from one month to three months post-surgery. It encompasses any region of the body (including organs or cavities) apart from the outer skin incision, fascia, or muscle layers that were exposed or handled during the surgical procedure, along with at least one of the following criteria being met: Fluid drainage from the affected organ/space displays purulent characteristics, Microorganisms are detectable through a culture of fluid or tissue obtained under sterile conditions from the organ/space, Any signs of infection or the presence of an abscess affecting the organ/space are observed either during a direct examination, a revision surgery, or through histopathological or radiological analysis.[5]

Figure (1): Type of Surgical Site Infection. [5]



Type of wound:

The US National Research Council group categorized operative wound classification in 1964[6]. This classification system categorizes wounds based on their level of contamination and infection risk. Clean wounds have no signs of inflammation, and the surgical procedure does not involve entering the respiratory, gastrointestinal, genital, or urinary tracts. Less than 2% of clean-operated wounds are affected by SSI, making them relatively low-risk regarding postoperative complications. Clean-contaminated wounds are characterized by surgical procedures that breach a colonized viscus or body cavity, albeit under controlled conditions with minimal spillage. The rate of SSI in clean-contaminated wounds typically falls between 3% and 11%, indicating a slightly higher risk compared to clean wounds. Contaminated wounds, on the other hand, involve surgeries where there are significant breaches in sterile technique, such as in cases of open cardiac massage or instances of substantial spillage from the gastrointestinal tract. Despite the administration of prophylactic antibiotics, the likelihood of infection in contaminated wounds exceeds 10%, marking them as moderate to high-risk scenarios for SSI development. Lastly, dirty wounds encompass operative procedures carried out in the presence of an active infection, thus already contaminated at the outset. In such cases, the rate of SSI can climb above 20%, highlighting the considerable risk and challenges associated with managing these highly contaminated wounds. This comprehensive classification system is a valuable tool for healthcare professionals to assess the infection risk associated with different types of operative wounds and tailor their preventive strategies accordingly.[7]

How to Wound infection:

It is crucial to focus on enhancing the patient's overall health in the preoperative phase through various measures such as achieving optimal glycemic control if the patient has diabetes, quitting smoking, enhancing nutritional status, and addressing any existing anemia. Additionally, it is recommended that all patients bathe with soap either the night before or on the day of the operation to minimize the risk of infections and ensure a clean surgical environment. These preoperative steps significantly prepare the patient for a successful surgical procedure and promote better postoperative outcomes.[7] According to the recommendations provided by the Centers for Disease Control and Prevention (CDC), hair removal should only be carried out if it poses a hindrance to the surgical procedure. When hair removal is deemed necessary, it is recommended to conduct this process right before the surgery using an electric clipper instead of shaving with a razor. Using a razor for shaving can lead to the formation of minuscule cuts and abrasions on the skin, which compromise the skin's protective barrier against the colonization of microorganisms, thereby escalating the chances of SSI in the postoperative phase.[8] Antibiotic prophylaxis is necessary for patients undergoing clean surgery with prosthesis implantation, clean-contaminated surgery, and contaminated surgery to prevent infections that may arise from the surgical procedures.[9] Patient theatre wear should be carefully chosen to ensure it is tailored to the patient's needs. This allows easy access to the operative site and other areas where medical equipment such as intravenous cannulas, catheters, and epidurals may need to be placed. This specificity in attire is crucial for the smooth flow of medical procedures and the patient's comfort throughout their treatment.[9] During the intraoperative phase, it is essential to properly prepare the patient's skin in the operating room by applying skin antiseptics, which are designed to diminish the presence of resident microflora in the vicinity of the incision site on the skin, ensuring a clean and sterile environment for the surgical procedure to take place.[9] Hand decontamination is crucial in the operating room to ensure patient safety and prevent infections. The surgical team must thoroughly clean their hands with an aqueous antiseptic solution before starting any procedure listed on the schedule. It is recommended that team members use disposable brushes or picks specifically designed to clean nails to avoid cross-contamination. After the initial hand wash, hands and nails should be visibly clean before proceeding with the surgical intervention. In addition, for subsequent procedures, healthcare workers must sanitize their hands with either an alcohol-based hand rub or an antiseptic surgical solution to maintain a sterile environment and minimize the risk of infections.[9] When it comes to wound closure and dressings, it is crucial that the dressing material used on the wound effectively maintains a moist environment to promote healing. This prevents devitalized tissue, toxic

chemicals, or particles that may be released from the dressing material, thus ensuring optimal conditions for the wound to heal properly.[9] During the postoperative phase, it is essential to clean the wound to prevent infection and promote healing meticulously; moreover, timely changing the wound dressing is crucial as it facilitates the elimination of surplus wound exudates, foreign bodies, and crusts from the wound surface, which are important steps in maintaining proper wound care.[9]

Wound care and management:

Postoperative wound care prevents complications and facilitates healing following surgical procedures. Research emphasizes the critical role of delivering thorough education to individuals undergoing surgery and the significance of fostering collaboration among healthcare professionals and promoting teamwork among nurses. Additionally, remote digital monitoring for assessing wounds is highlighted as a valuable tool in this process. Comprehensive wound care education encompasses guidance on maintaining and changing wound dressings, which reduces the likelihood of developing surgical site infections. Furthermore, the adoption of collaborative practices and teamwork within the healthcare setting has been shown to enhance the management of postoperative wound care. Integrating remote digital monitoring technologies into care protocols can significantly improve patient outcomes by allowing for prompt interventions and lessening the impact of surgical site infections. In essence, a multifaceted approach that incorporates patient education, interprofessional teamwork, and innovative monitoring strategies is crucial for the optimal provision of postoperative wound care.[10]

Postoperative wound treatment comprises a variety of interventions aimed at fostering the healing process and averting complications. These interventions include applying absorbent dressings during wound care, utilizing negative-pressure suction and irrigation techniques, and incorporating state-of-the-art antimicrobial wound dressings. Various approaches can be implemented at different stages of the wound healing trajectory to mitigate the formation of scars. Before surgery, it is imperative to optimize the placement of incisions to diminish tension and carefully address any comorbidities specific to the patient. Layered closure and tissue expansion can effectively reduce tension across the wound site during the surgical procedure. Following surgery, maintaining a well-moisturized wound environment, selecting suitable dressings and ointments, incorporating silicone products, and contemplating the use of vitamins and corticosteroids can all contribute to facilitating the healing process and minimizing scarring. Furthermore, innovative treatments such as tension-offloading topical therapies and scarless wound healing therapeutics exhibit the potential to advance scar reduction research in the future. By amalgamating these various strategies, it becomes feasible to diminish scarring and significantly enhance the overall outcomes of wound healing.[11,12]

Conclusion:

The article advocates for a comprehensive approach to postoperative wound care, encompassing patient education, interprofessional teamwork, and innovative monitoring strategies to optimize outcomes and minimize complications.

References

1. Yao K, Bae L, Yew WP: Post-operative wound management. *Aust Fam Physician*. 2013, 42:867-870.
2. Thamilselvam P, Vinothkumar R, Singh S: Surgical wound care. *JOJ Nursing & Health Care*. 2017, 2:41-45.
3. Lari A, Alherz M, Hussain S, et al.: The Importance of Scar Cosmesis across the Surgical Specialties: Factors, Perceptions, and Predispositions. *Plastic and Reconstructive Surgery – Global Open*. 2022, 10.
4. Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG: CDC definitions of nosocomial surgical site infections, 1992: a modification of CDC definitions of surgical wound infections. *Infection Control & Hospital Epidemiology*. 1992, 13:606-608.

5. Carreira LM, Belo L, Serrano I, Cunha E, Oliveira M: Surgical blades as bacteria dissemination vehicles in dogs undergoing surgery – a pilot study. *Biomedical Engineering International*. 2020, 2:25-29. 10.33263/BioMed21.025029
6. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Committee HICPA: Guideline for prevention of surgical site infection, 1999. *Infection Control & Hospital Epidemiology*. 1999, 20:247-280.
7. Singh R, Singla P, Chaudhary U: Surgical site infections: classification, risk factors, pathogenesis and preventive management. *Int J Pharm Res Health Sci*. 2014, 2:203-214.
8. Hamilton H, Hamilton K, Lone F: Preoperative hair removal. *Canadian Journal of surgery Journal Canadien de Chirurgie*. 1977, 20:269-271,274.
9. Hranjec T, Swenson BR, Sawyer RG: Surgical site infection prevention: how we do it. *Surgical infections*. 2010, 11:289-294.
10. Baranoski S, Ayello EA: *Wound care essentials: Practice principles*. Lippincott Williams & Wilkins, 2008.
11. Parikh UM, Mentz J, Collier I, et al.: Strategies to Minimize Surgical Scarring: Translation of Lessons Learned from Bedside to Bench and Back. *Advances in Wound Care*. 2021, 11:311-329. 10.1089/wound.2021.0010
12. Gantwerker EA, Hom DB: Principles to minimize scars. *Facial Plast Surg*. 2012, 28:473-486. 10.1055/s-0032-1325648