ORIGINAL ARTICLE

ROLE OF ASEPTIC MEASURES IN PREVENTING SURGICAL SITE INFECTIONS IN SKIN BIOPSY PROCEDURES

Jauhar Mumtaz Khan[1], Muhammad Usman Rathore[2], Moizza Tahir[3], Waqar Malik[4], Ali Riaz[5]

[1]Consultant Dermatologist Department of Dermatology, PAF Hospital, PAF Base Faisal Karachi, [2]Consultant Histopathologist Department of Pathology, Armed Forces Hospital Najran, Saudi Arabia, [3]Consultant Dermatologist Department of Dermatology, CMH Gujranwala, [4]York teaching Hospitals, [5]Consultant Dermatologist Department of Dermatology, CMH Malir, Karachi.

ABSTRACT

Objective: To evaluate the role of aseptic measures in preventing surgical site infections in skin biopsy procedures.

Study design: Prospective, observational study.

Place and duration of study: Department of Dermatology, PAF Hospital, PAF Base Faisal, Karachi, 16 months (October 2019 to January 2021).

Methodology: The study included all patients who underwent skin biopsies, except punch and shave biopsies during the study period. The procedure was done under strict aseptic measures in a dedicated room of the operation theatre, according to the standard protocol, and the patients were followed up for any surgical site infection. Demographic data of the patients along with other parameters, including comorbid conditions, presence or absence of surgical site infection, site of biopsy, type of biopsy, and type of sutures applied were recorded for each patient by direct observation. Data were analyzed using SPSS version 18.

Results: Total 151 patients, with a mean age of 36 ± 14 years, were included in the study. Out of 151 patients, 99 (65.6%) were males and 52 (34.4%) were females. Excision biopsy was done in 58 (38.4%) and incision biopsy in 93 (61.6%) patients. The most commonly biopsied site was the trunk (45 patients). Wound infection was present in 04 patients. Out of the 04 infected patients, 02 had diabetes mellitus and 01 was a smoker.

Conclusion: Effective aseptic measures reduce surgical site infections in skin biopsy procedures.

Keywords: *Biopsy, Dermatology, Surgical wound infections.*

How to cite this article: *Khan JM, Rathore MU, Tahir M, Malik W, Riaz A. Role of Aseptic Measures in Preventing Surgical Site Infections in Skin Biopsy Procedures. HMDJ. 2024 Dec; 04(02): 40-44. https://doi.org/10.69884/hmdj.4.2.9820.*

INTRODUCTION

Skin is the largest organ of the body accounting for 15% of the total body weight [1] . It comprises a unique and complex structure and has varied and extremely diverse functions [2] . It not only acts as a mechanical barrier against external harmful agents but also functions as an immunologic organ and helps in maintaining body temperature and electrolyte balance, in addition to numerous other functions [3].

Correspondence to: Dr. Jauhar Mumtaz Khan, Consultant Dermatologist Department of Dermatology, PAF Hospital, PAF Base Faisal Karachi.

Email: jauharmumtaz@hotmail.com

Received: 11-11-2024
Revision: 30-11-2024
Accepted: 12-12-2024

Considering the composite structure and diversified functions of the skin, this organ hosts a spectrum of diseases, ranging from primary inflammatory and immunologic disorders to neoplastic lesions and secondary involvement of systemic disorders [4,5]. Proper and thorough physical examination is the corner stone for reaching a correct diagnosis of skin diseases [6]. Clinical examination alone is not helpful in reaching the accurate diagnosis in most cases and the maximum a dermatologist can achieve, is a list of differential diagnosis, narrowing the broad spectrum of skin diseases [7]. In these circumstances, skin biopsy becomes the primary diagnostic modality for a definite diagnosis [8].

Skin biopsy is a relatively simple procedure which is done under local anesthesia as an outpatient department procedure [9]. If proper care and antiseptic measures are taken, this procedure is uneventful. However, complications arise in some cases, surgical site infections (SSI) being the most common [10]. Other

doi.org/10.69884/hmdj.4.2.9820

complications include pain, bleeding, dehiscence etc. There are many factors which can lead to complications such as humid environment, improper sterilization, site and type of biopsy, use of steroids, comorbid conditions such as diabetes mellitus and biopsy setup [11].

Prophylactic antibiotics are generally used to prevent wound infection in skin biopsies. Their use in clean wounds is usually less warranted, however, it is recommended in certain conditions such as dirty wounds [12]. Factors such as immunosuppression and humid environment also favor the use of antibiotics [13].

CAPSULE SUMMARY

Strict aseptic protocols during skin biopsy operations can significantly reduce wound infections, eliminating the need for topical or oral antibiotics. Antibiotic resistance will ultimately decline if unneeded antibiotics are avoided during minor surgical procedures like dermatological surgery.

Although antibiotic use can help prevent wound infections, it has a few drawbacks as well, one of the most important being, antibiotic resistance[14,15]. One of the measures to decrease the risk of post-skin biopsy wound infections without using antibiotics is to follow strict aseptic measures, performing the procedure in a dedicated operating room as an additional aseptic measure[16]. A thorough search of the electronic media revealed that no study has been conducted in Pakistan to evaluate the impact of aseptic measures in dermatologic biopsy procedures to prevent surgical site infections.

This study was thus designed to assess the effects of aseptic measures in preventing wound infections in skin biopsy procedures in a military hospital in Karachi. These measures can lead to decreased use of antibiotics and ultimately result in a decline in antibiotic resistance.

METHODOLOGY

This prospective, observational study was done in the Department of Dermatology, PAF Hospital, PAF Base Faisal, Karachi, from 23 October 2019 to 15 January 2021. The sample size of 151 was found with the World Health Organization (WHO) calculator, with a confidence interval of 95% and a margin of error of 5%. All patients reporting to the out-patient section of the Dermatology department, with skin lesions underwent either incision biopsy or excision biopsy, for diagnostic or therapeutic purposes, were included in the study by a non-probability convenience sampling technique. Informed consent of the patients and approval from the hospital's ethics committee (Reference number: IRB/Faisal/06/2019, Date: 6-6-2019) were obtained. Patients unwilling to undergo biopsy, patients requiring punch or shave biopsies, patients having infected wounds/ lesions or bleeding tendencies and those on anticoagulant therapy were not included in the study.

The steps of the procedure were explained to the willing patients. A brief clinical history was taken and any comorbid conditions, such as smoking or diabetes mellitus, were recorded. The procedure was done in a designated room of the operation theatre under strict sterilization. Sterile, packed and non-reusable gloves were worn by all individuals involved in the procedure. The biopsy site was scrubbed with Pyodine, as per protocol. For maximum effect of Pyodine ,05 minutes were given. A local anaesthetic agent (1% lignocaine with adrenaline) was used. A surgical towel was draped to maintain the sterilization field. Biopsy was performed depending on the nature of the lesion. Incision biopsy was mainly done for diagnostic purposes, and excision biopsy for both diagnostic and therapeutic purposes. Therapeutic excision biopsies were taken from pilar and epidermoid cysts of the face, trunk and axilla. Excision biopsies were done in suspected patients of basal cell carcinoma, actinic keratosis with atypical symptoms, Bowen's disease, glomus tumour, pyogenic granuloma and other neoplastic lesions of the skin. After biopsy, the wound was stitched with appropriately sized interrupted proline sutures. Where larger sections of the skin were taken, mattress sutures were applied. Excision biopsies of the face were closed using subcuticular sutures for maximum cosmetic effect. For nail bed and oral mucosal biopsies, absorbable chromic sutures were used instead of proline sutures. Following biopsy, the surgical site was scrubbed with Pyodine to cater for any residual blood which is a source of infection as it acts as a substrate for bacterial growth. A simple dressing with Polymyxin was applied on the stitched wounds other than those of oral mucosa. Patients were asked to come to the department for a dressing change the next day. They were also instructed about wound care like, keeping it dry & away from dust and unnecessary exposure. Stitches were removed after five days for facial biopsies and seven days for the rest of the body sites. The biopsy site was observed for wound dehiscence and any signs of infection including erythema, pain, swelling, and pus discharge. If the biopsy site was infected, a five-day course of oral Co-amoxiclav 626 mg thrice daily along with topical Fucidic acid was prescribed and the patients were instructed to come for follow-up after five days.

Demographic data including name, age and gender of all patients were recorded along with other parameters such as site, size and type of biopsy (Incisional or excisional), type of sutures applied (Interrupted, mattress or subcuticular), comorbid conditions (Diabetes Mellitus, smoking, none), days after which the stitches were removed (05 days, 07 days or absorbable sutures), wound dehiscence and wound infections (present or absent). Data were recorded on a proforma, based on direct observation.

The data were analyzed, using SPSS version 18. The means and standard deviation were calculated for the numerical variables, like age. Frequencies & percentages were presented for the categorical variables for example gender, site and type of biopsy, type of sutures applied, comorbid conditions, days after which the stitches were removed, wound dehiscence and SSI.

RESULTS

The study was conducted on total of 151 individuals. The mean age of the patients was 36 ± 14 years with the minimum and maximum ages of 5 and 83 years respectively. Out of 151 patients, 99 (65.6%) were males and 52 (34.4%) were females.

Excision biopsy was done in 58 (38.4%) patients and incision biopsy was done in 93 (61.6%). The most common site biopsied was the trunk i.e., in 45 patients. The frequency of skin biopsies done from various sites of the body is summarized in Table 1. The mean size of the skin biopsy was 8 ± 1.2 mm with a minimum size of 4 mm to a maximum of 20 mm. After the skin biopsy, interrupted sutures were applied in 101 (66.9%) cases, subcuticular sutures in 36 (23.8%) and mattress sutures in 14 (9.3%) cases. Number of patients having comorbid conditions is summarized in Figure 1. Based on the site of the biopsy, the sutures were removed after either 05 days or 07 days, its frequency is compiled in Figure 2. Total 04 patients (2.6%) patients developed SSI (Secondary bacterial infection of surgical wounds) and the remaining 147 (97.4%) patients showed no complication in the skin biopsy wound. Total 03 infected wounds were from the leg and 01 from the trunk. The frequency of wound infection in comorbid conditions of the patients is summed in Table 2.

None of the biopsy sites showed wound dehiscence. In the infected wounds, the need to remove stitches prematurely was not mandated, as the infection in all the cases settled after 05 days of oral antibiotics.

DISCUSSION

Skin biopsy is the main diagnostic tool available to dermatologists. Its diagnostic importance cannot be over-emphasized in dermatology practice. The current dilemma of rising antibiotic resistance has highlighted the need to redefine the need for the prescription of antibiotics. To reduce the incidence of SSI, surgical antibiotic prophylaxis (SAP) is an evidence-based practice [17]. Antibiotic prophylaxis in dermatological surgery is recommended in special circumstances such as prosthetic heart valves or joints. World Health Organization has defined antibiotic resistance as the biggest threat to global health [18]. The commonly prescribed topical antibiotics include bacitracin, polypore, mupirocin, hydrogen peroxide and non-antibiotic ointments including petrolatum-based products [19]. These are employed in pre and post-procedure wound care. Antiseptics are also advised to reduce SSI. Overzealous use of topical antibiotics to guard against infection has contributed to enhanced bacterial resistance and is currently not recommended, in clean wounds, by the American Academy of Dermatology [20,21] .

The risk of SSI depends on comorbid conditions and the environment. The patient-related comorbidities include advanced age, diabetes mellitus, renal disease, immunosuppression, smoking, obesity etc. Environmental factors include length and technique of the procedure, preoperative sterilization and aseptic measures [22] .

Bacteria can gain entry into the wound if sterilization protocols are improperly implemented or through airborne, aerosol or dust particles. The rate of infection in dermatological surgery is low and can easily be treated with oral antibiotics. Infection rates are directly proportional to the length of the procedure and certain body sites. Dixon et al. assessed the infection rate in 2424 patients who underwent a wide range of dermatological procedures. They observed an infection rate of greater than 5% in procedures performed below the knee, groin, ear and lip[23]. Hence, the decision to prescribe a prophylactic antibiotic should be based on patient comorbidities and biopsy site.

There is also an increased risk of postoperative infections if poor surgical technique is employed. Examples include too much pressure on sutures, causing ischemia at the site, using too much suturing material, and not shaving body hair at the surgical site. All these lead to higher rates of wound infection.

The role of topical antibiotics has been studied to detect their effectiveness in wound healing and prevention of wound infection. It was demonstrated by Smack et al that the rate of infection between two groups of topical antibiotic ointment and topical petrolatum was equal among 922 patients. The topical petrolatum acted as a wound moisturizer and prevented exposure of the wound to debris and dust particles. The added advantage of using simple petrolatum was that it did not contribute to rising antibiotic resistance [24] . We also employed topical Polymyxin ointment postoperatively at the time of first dressing to give immediate protection to the surgical wound.

According to Akiyama, there was no case of SSI in 75 punch biopsies were one group was given prophylactice antibiotics and other was not [25] . As there was no case of SSI in this study, it is concluded that the role of prophylactic antibiotics in skin biopsy procedures where proper aseptic measures are applied is not warranted. In our study, four patients developed SSI but these were incision and excision biopsies, and no punch biopsy.

Total 04 out of 151 patients developed SSI in our study, 03 of them had comorbid conditions (diabetes mellitus in two patients and smoking in one). Out of 04 infected patients, 03 were biopsied from the trunk and one from the leg. Only 02 patients were elderly diabetics. The other 02 patients were young adults with active lifestyles and they did not take time off from work to rest, which might have contributed to their wounds becoming infected. All cases were treated with a 05- day- course of oral Co-amoxiclav and topical Fucidic acid. The infections resolved without any complications. Due to the very small number of infected cases, the association of wound infection with either comorbid conditions or the site of biopsy could not be established in our study. A study revealed an increase in SSI in the absence of antibiotic prophylaxis but a difference in the size of study group may be the explanation for it [26].

We underscored the importance of strict aseptic measures to preclude the need for oral antibiotic prophylaxis after skin

biopsy. Many international studies have been done to judge the role of oral antibiotics in dermatological procedures. All have reported low infection rates if strict aseptic measures are taken instead of prophylactic antibiotics [10,16,25,26] .

Our study also vindicates the previous international studies. Another factor that we included as a comorbid was the hot and humid environment of Karachi. In theory and practice, we observe increased cutaneous bacterial infections in tropical areas. However, if the procedure is a simple biopsy involving a clean wound, and strict aseptic techniques are employed, the need for prophylactic antibiotics is obviated even in tropical areas.

CONCLUSION

Ensuring strict aseptic measures in skin biopsy procedures can be very helpful in reducing wound infections thus obviating the need for oral or topical antibiotics. Avoiding unnecessary antibiotics in minor surgical procedures such as dermatological surgery will eventually lead to decreased antibiotic resistance.

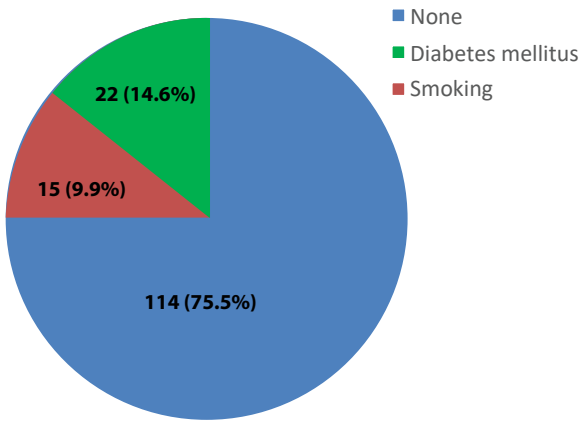

Figure 1: Frequency and percentages of comorbid conditions in the patients

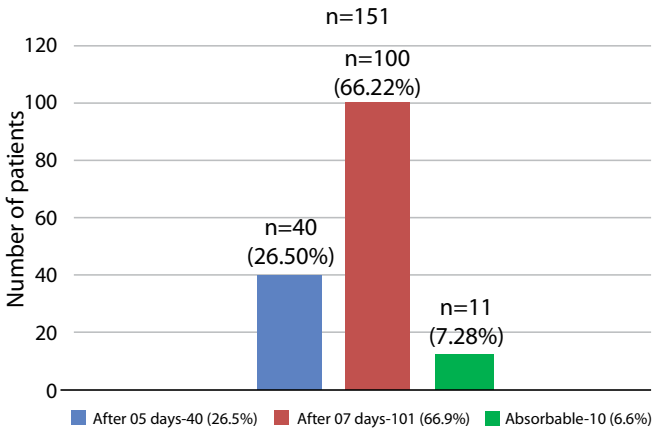

Figure 2: Distribution of patients according to the number of days after which the stitches were removed

Table 1: Frequencies and percentages of sites of skin biopsy

Sr no.	Site of biopsy	Frequency (n=151)	Percentage (%)
1	Head and neck	41	27.2
2	Arms	21	13.9
3	Trunk	45	29.8
4	Groin	5	3.3
5	Legs	29	19.2
6	Nail bed/ matrix	08	5.3
7	Oral mucosa	02	1.3

Table 2: Frequency of wound infection in comorbid conditions

Comorbid conditions	Wound infection		Total
	Yes	No	
None	01	113	114
Diabetes mellitus	02	13	15
Smoking	01	21	22
Total	04	147	151

ETHICAL APPROVAL: *Reference number: IRB/ Faisal/06/2019, Date: 6-6-2019*
CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*
AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*
FINANCIAL DISCLOSURE/ FUNDING: *None*
ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*
CONFLICT OF INTEREST: *None*
ACKNOWLEDGEMENT: *None*
AUTHORS' CONTRIBUTION

- ***Jauhar Mumtaz Khan:*** *Drafting the article, acquisition of data, critical revision*
- ***Muhammad Usman Rathore:*** *Analysis and interpretation of data*
- ***Moizza Tahir:*** *Conception and design, Acquisition of data, critical revision*
- ***Waqar Malik:*** *Analysis and interpretation of data*
- ***Ali Riaz:*** *Acquisition of data, Drafting the article*

REFERENCES

1. Kanik A, Li M, Urmacher CD. Normal Skin. In: Mills SE, editor. Histology for pathologists, 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2012. P 3.
2. Yousef H, Alhajj M, Sharma S. Anatomy, Skin (Integument), Epidermis. In: StatPearls. StatPearls Publishing, Treasure Island (FL); 2023. PMID: 29262154.
3. Agarwal S, Krishnamurthy K. Histology, Skin. StatPearls. Treasure Island (FL): StatPearls Publishing. 2019.
4. Urban K, Chu S, Giesey RL, Mehrmal S, Uppal P, Delost ME, et al. Burden of skin disease and associated socioeconomic status in Asia: a cross-sectional analysis from the global burden of disease study 1990-2017. JAAD international. 2020 Dec 10;2:40-50. https://doi.org/10.1016/j.jdin.2020.10.006.
5. Billings SD. Dermatoses & tumor and tumorlike conditions of the skin. In: Goldblum JR, Lamps LW, McKenney JK, Myers JL, editors. Rosai and Ackerman's Surgical Pathology, 11th ed. Philadelphia: Elsevier; 2018. P. 6-143.
6. Akingbola CO, Vyas J. Dermatological history and examination. Medicine. 2021 ;49(6):343-349. https://doi.org/10.1016/j.mpmed.2021.03.002.
7. Ochsendorf F, Meister L. Examination procedure and description of skin lesions. Hautarzt. 2017 Mar; 68(3):229-242. https://doi.org/10.1007/s00105-017-3939-y.
8. Ghias A. Skin biopsy-some key concepts and guidelines. J Pak Assoc Dermatol. 2018 Dec 13;28(2):250-255.
9. Nischal U, Nischal KC, Khopkar U. Techniques of skin biopsy and practical considerations. J Cutan Aesthet Surg. 2008 Jul-Dec; 1(2):107-111. https://doi.org/10.4103/0974-2077.44174.
10. Puri A, Wuertz B, Rhodus NL, Ondrey FG. Safety of oral mucosal punch biopsy and other oral biospecimen collections in clinical research. Oral Surg Oral Med Oral Pathol Oral Radiol. 2024 Oct 30:S2212-4403(24)00616-3. https://doi.org/10.1016/j.oooo.2024.10.084.
11. Yasui Y, Kato H, Oda T, Nakamura M, Morita A. Complications and risk factors of punch biopsy: a retrospective large-scale study. J Dermatol. 2023 Jan;50(1):98-101. https://doi.org/10.1111/1346-8138.16585.
12. Bari O, Eilers Jr RE, Rubin AG, Jiang SI. Clinical characteristics of lower extremity surgical site infections in dermatologic surgery based upon 24-month retrospective review. J Drugs Dermatol. 2018 Jul 1;17(7):766-771. PMID: 30005099.
13. Balakirski G, Becker SL, Hartmann D, Kofler L, Kunte C, Müller CS, et al. Perioperative antibiotic prophylaxis in skin surgery–Position paper of the Antibiotic Stewardship working group of the German Society for Dermatologic Surgery (DGDC), Part 2: Special indications and situations. J Dtsch Dermatol Ges.2023 Oct;21(10):1109-1117. https://doi.org/10.1111/ddg.15153.
14. Balakirski G, Kotliar K, Pauly KJ, Krings LK, Rübben A, Baron JM, et al. Surgical site infections after dermatologic surgery in immunocompromised patients: A single-center experience. Dermatol Surg. 2018 Dec; 44(12):1525-1536. https://doi.org/10.1097/DSS.0000000000001615.
15. Mobarki N, Almerabi B, Hattan A. Antibiotic resistance crisis. IJMDC. 2019;40(4):561-564. https://doi.org/10.24911/IJMDC.51-1549060699.
16. Kolimi P, Narala S, Nyavanandi D, Youssef AA, Dudhipala N. Innovative treatment strategies to accelerate wound healing: trajectory and recent advancements. Cells. 2022 Aug 6;11(15):2439-2484. https://doi.org/10.3390/cells11152439.
17. Masse V, Edmond MB, Diekema DJ. Infection prevention strategies for procedures performed outside operating rooms: A conceptual integrated model. Am J Infect Control. 2018 Jan; 46(1):94-96. https://doi.org/10.1016/j.ajic.2017.07.030.
18. Kefale B, Tegegne GT, Degu A, Molla M, Kefale Y. Surgical site infections and prophylaxis antibiotic use in the surgical ward of public hospital in western ethiopia: a hospital-based retrospective cross-sectional study. Infect Drug Resist. 2020 Oct; 13: 3627-3635. https://doi.org/10.2147/IDR.S281097.
19. World Health Organization. Antimicrobial Resistance [Internet]. WHO. 2023 N0v 21. Available from: https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance.
20. Fathy R, Chu B, Singh P, James WD, Barbieri JS. Variation in topical antibiotics recommendations in wound care instructions by non-dermatologists. J Gen Intern Med. 2021 Jan; 36(1): 238-239. http://doi.org/10.1007/s11606-020-05689-2.
21. Totoraitis K, Cohen JL, Friedman A. Topical approaches to improve surgical outcomes and wound healing: a review of efficacy and safety. J Drugs Dermatol. 2017 Mar 1;16(3):209-212.
22. Schlager JG, Hartmann D, San Jose VR, Patzer K, French LE, Kendziora B. Procedure-related risk factors for surgical site infection in dermatologic surgery. Dermatol Surg. 2022 Oct 1;48(10):1046-1050. http://dx.doi.org/10.1097/DSS.0000000000003546.
23. Dixon AJ, Dixon MP, Askew DA, Wilkinson D. Prospective study of wound infections in dermatologic surgery in the absence of prophylactic antibiotics. Dermatol Surg. 2006; 32(6):819-827. https://doi.org/10.1111/j.1524-4725.2006.32167.x
24. Smack DP, Harrington AC, Dunn C, Howard RS, Szkutnik AJ, Krivda SJ, et al. Infection and allergy incidence in ambulatory surgery patients using white petrolatum vs bacitracin ointment. A randomized controlled trial. JAMA. 1996 Sep 25; 276(12):972-977. https://doi.org/10.1001/jama.1996.03540120050033.
25. Akiyama Y, Norimatsu Y, Ohno Y. Prophylactic antimicrobials may not be needed to prevent surgical site infection after skin biopsy: a retrospective study. Antimicrob Resist Infect Control. 2022 Feb;11(1):35-39. https://doi.org/10.1186/s13756-022-01077-z.
26. Kendziora B, Patzer K, French LE, Schlager JG, Hartmann D. Antibiotic prophylaxis of surgical site infections in cutaneous surgery: a prospective observational study. Acta Derm Venereol. 2023 May ;103:adv4469. https://doi.org/10.2340/actadv.v103.449.