

ORIGINAL ARTICLE

The presence of bacteria on long, artificial or polished native nails and risk of surgical site infection in patients who wore these nails

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ABSTRACT

Aim: To determine the bacterial flora present on- and under long, artificial or polished native nails of patients who undergo elective surgery due to common hand diseases and if this poses the risk of surgical site infection.

Materials and Methods: Forty-six female patients having long, artificial or polished native nails were operated on. In 10 of these patients, a swab was taken from the surface of the nails and from under the nails prior to- and after the operation. It was assessed whether there were infections of the operated site in any of the patients.

Results: Before hand preparation cultures were positive in all 10 patients and the most common organisms were coagulase-negative *Staphylococci*. Post-preparation cultures were positive also in all 10 patients with the same organism being the most common. However, the number of organisms in post-preparation samples was significantly lower, than in pre-preparation. No one case of surgical site infection was noted in 46 patients in the study at 1 month assessment.

Conclusions: The bacterial flora present on and under long, artificial or polished native nails is mostly composed of natural skin microbiota. Presence of bacteria on and under nails does not increase the risk of surgical site infection.

KEY WORDS: surgical site infection, artificial fingernails (tips), nails contamination, hand preparation, bacteria culturing

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INTRODUCTION

The use of artificial nails (so-called tips) and polished, native nails has become a popular trend among women, including those working in health care - nurses and doctors (Fig. 1, Fig.2). It is unclear whether wearing tips puts patients at increased risk of infection. The results of some studies indicate that the number of bacterial colonies on- and under artificial nails is higher than on- and under natural ones. The same is true of long and polished native nails [1-5]. In addition, they have been shown to worsen the quality of hand disinfection and cause more frequent tearing of the gloves when put on [5, 6]. However, results of some studies do not acknowledge this risk [7]. Infectious bacteria can be of self-origin (found on and under the nail plate) or be transmitted from one patient to another through the nails of the medical staff. However, there is no information in the literature about the risk of surgical site infection (SSI) in a patients operated on due to hand disease or injury, who wear tips or long, polished native nails.

AIM

The aim of the study was to determine the bacterial flora present on- and under long, artificial or polished native nails, as well as to assess the risk of surgical site infection in patients wearing these nails, who undergo elective surgery due to common hand diseases.

MATERIALS AND METHODS

In 2025, 988 patients were operated on in the author's institution due to common hand diseases such as carpal canal syndrome, trigger finger, benign hand tumour, wrist or finger ganglion, Dupuytren's disease and de Quervain's disease. All surgeries were performed in an out-patient setting (one-day care), in the procedure room at the surgical ward, under WALANT or local anaesthesia. Forty-six female patients (4,6%) were identified who wore tips (n=17) or had their own long, polished nails (n=29) that met the criteria for inclusion in the study. Twenty-six pa-



Fig. 1. Artificial nails (tips)
Picture taken by the authors



Fig. 2. Polished, native nails
Picture taken by the authors

tients (56%) were operated on due to carpal tunnel syndrome, 10 due to trigger digits (22%), five due to benign finger tumours (11%) and remaining five (11%) due to Dupuytren's disease, wrist ganglions or de Quervain's disease. In 10 of these patients, a swab was taken from the surface of the nails and from under the nails. The swab was taken twice, before hand disinfection for surgery and after surgery. The biological material was then tested in a microbiology lab for the type of bacterial flora and its abundance (few colonies or numerous colonies) in each of the samples. All patients enrolled in the study were then evaluated at 1 month post-surgery for possible surgical site infection. The results ob-

tained in these stages of the study are the basis for this assessment.

ETHICS

This work complies with the principles of the Declaration of Helsinki.

AI STATEMENT

The author states that no AI tools were used in writing this article.

RESULTS

Types and abundance of organisms found in swab samples (Table 1).

Before hand preparation (disinfection) cultures were positive in all 10 patients. The most common bacteria cultured from pre-preparation samples were coagulase-negative *Staphylococci*, followed by, *Rothia* and *Bacillus* species. Post-preparation cultures were positive also in all 10 patients. The most common bacteria culture post-preparation were also coagulase-negative *Staphylococci*. The number of organisms in post-preparation samples was significantly lower, than in pre-preparation (Table 1), but there was no case of total bacteria eradication from the nails or under the nails following disinfection. Among the 10 patients who were sampled for bacteriological examination, one case of the pathogen - *Staphylococcus aureus* - was found in the study in pre-preparation sample. This organism was not present in a post-preparation sample (it has been eradicated).

Surgical site infections after 1 month. No one case of SSI was recorded in 46 patients in the study at 1 month assessment.

Table 1. Types of organisms found in swab samples in 10 patients in the study. Markings: (+) few colonies, (+++) numerous colonies

Name of the organism	Number of positive samples	Colonies of organisms volume in the sample	
		Pre hand disinfection	After hand disinfection
<i>Staphylococcus epidermidis</i>	8	6 (+++) 2 (+)	6 (+)
<i>Staphylococcus pasteurii</i>	7	2 (+++) 5 (+)	1 (+++) 4 (+)
<i>Staphylococcus warneri</i>	9	3 (+++) 6 (+)	1 (+++) 5 (+)
<i>Staphylococcus haemolyticus</i>	8	1 (+++) 7 (+)	1 (+++) 3 (+)
<i>Staphylococcus aureus</i> MSSA	1	1 (+)	(-)
<i>Rothia kristinae</i>	6	1 (+++) 5 (+)	4 (+)
<i>Rothia amarae</i>	5	2 (+++) 3 (+)	1 (+)
<i>Bacillus species</i>	5	2 (+++) 3 (+)	3 (+) 1 (+++)

Source: compiled by the authors of this study

DISCUSSION

There is no information in the literature whether wearing tips or long, polished native nails poses a risk of SSI after operations for hand diseases and injuries. About 10-15 years ago, it was recommended that patients cut long nails, wash off varnish and remove tips before hand surgery [8]. Later, no such requirements were imposed, but this change has not been preceded by official recommendations or scientific studies, but has occurred gradually and spontaneously. While there is a lot of information in the literature about the risk of transmission of bacteria on tips and long nails worn by healthcare workers, particularly nurses and doctors, there is practically no knowledge about it in patients. Therefore, the results of this study are in the first scientific evidence on this issue. Our results show that wearing tips and long, polished nails by patients who undergo surgery due to common hand diseases does not pose a risk of SSI, although bacteriological testing has shown the presence of various organisms on- and under the nails/tips. However, the vast majority of these organisms are physiological flora present on the hands, and only in one case has the pathogen been found - *Staphylococcus aureus*. The results of our study also indicate that standard hand preparation before surgery reduces, but does not eliminate bacteria colonies from nails and tips, but this does not affect the risk of SSI.

The authors did not find any single article in the literature presenting the results of research similar to those presented in this work. The next paragraph is a review of the current literature on the presence of pathogens on nails and tips among healthcare professionals and the associated risks to patients.

Pottinger et al. (1989) reported results of the study comparing the effect of handwashing on presence of organisms on fingertips in women wearing tips vs native nails. Cultures were obtained before and after handwashing from the fingertips of 56 nurses wearing tips nails and 56 nurses with native nails. Results of the study showed that there was statistically significantly more colonies of gram-negative rods cultured from the fingertips with artificial nails than from natural nails, both before and after handwashing. However, washing resulted in significant reduction of number of bacterial colonies present on fingertips. There were no significant differences in carriage of gram-positive cocci or normal flora. The authors conclude that health care workers who wear tips should consider the potential risk of increased carriage of gram-negative rods [1].

Hedderwick et al. (2000), reported results of the study comparing the presence and quantity of potential pathogenic organisms on artificial vs native nails in healthcare workers. Nail and subungual surfaces were swabbed. Thirty persons who wore permanent acrylic artificial nails were compared with 12 controls who had native nails. Organisms such as *Staphylococcus aureus*, gram-negative *bacilli*, *enterococci*, and *yeasts* were considered to be potential pathogens. Results of the study showed that tips were more likely to retain pathogens, especially gram-negative *bacilli* and *yeasts*, than native nails. Colonization of the tips increased over time: the longer they were worn, the more likely that a pathogen was isolated. The authors conclude that current recommendations restricting wearing of artificial fingernails by healthcare workers appear justified [2].

McNeil et al. (2001) reported results of the study undertaken to determine differences in microflora on the nails of health care workers wearing tips compared with control workers with native nails and to assess the effect on these microflora of hand cleansing with antimicrobial soap or alcohol-based gel. Cultures were obtained from 21 persons wearing artificial nails and 20 control persons before and after using antimicrobial soap or alcohol-based gel. Results of this study showed that statistically significantly greater number of healthcare workers with artificial nails had a pathogen (gram-negative bacilli, *Staphylococcus aureus*, or yeasts) isolated before cleansing, compared with controls. Similarly, statistically significantly more persons with tips than controls had pathogens remaining after hand cleansing with soap or gel. Of persons wearing tips, only 11% cleared pathogens with soap compared with 38% with gel. Of persons with native nails only 14% cleared with soap compared with 80% with gel. The authors conclude that artificial acrylic fingernails could contribute to the transmission of pathogens, and their use by healthcare workers should be discouraged [5].

In contrast, Arreba et al. (2025) in their recent study showed that compared with native and not polished nails, gel polished nails were not associated with a higher bacterial burden within 3 weeks of application, and even had a significantly lower bacterial burden before hand washing on day 21 [7]. However, this study is the only one among the vast majority emphasising the risk of transmission of bacteria through the long nails and tips of medical personnel [9, 10].

LIMITATIONS

The first is the small number of patients whose samples were taken for bacteriological examination. More reliable results would require testing about 30 subjects, so our results should be considered a preliminary report. A larger number of studies would likely reveal a greater spectrum of bacteria found under the nails. However, lack of SSI in the whole group of 46 patients suggests that the risk of transmission of bacteria from under the nails to the operated site is minimal.

Another problem may be the issue of liability in the event of SSI in a patient with long nails or wearing tips. Lack of evidence in the literature of a higher risk of infection in these cases and the lack of official recommendations on how to proceed in such cases seems to indicate that the risk of the court finding that the infection was the fault of the surgeon is unlikely.

CONCLUSIONS

The bacterial flora present on and under long, artificial or polished native nails is mostly composed of natural skin microbiota. Presence of pathogens is incidental. Presence of bacteria on and under long, artificial or polished native nails does not increase the risk of SSI after elective hand operations. Further studies based on a larger group of patients are required to make conclusions about the risk of SSI in patients wearing long nails and tips more reliable.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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