

Patient preferences for surgery or non-surgery for the treatment of clavus and callus at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia



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ABSTRACT

Background: Clavus and callus are common hyperkeratotic lesions that can be very painful and affect the quality of life. The clinicians are faced with various factors affecting the resolution of the lesion, and no treatment has been considered ideal. Surgical has been preferable to conservative treatment but is still more likely to increase patients' desirability due to great discomfort. This study aims to evaluate the factors contributing to the resolution of callus and clavus.

Methods: Retrospective analysis was done on 25 medical records of patients who met the inclusion criteria. Factors contributing to the lesion resolution were identified and analyzed using the SPSS version 17 program.

Result: Among 25 (33.7%) patients recruited for the study, 13 were (52%) male and 12 (48%) female. The most common types of lesions were clavus (20 [80%]). In both cases, the distribution of lesion locations was mostly found in the lower extremities (20 [80%]). Excision was performed in 21 cases (84%), and 20 patients (80%) achieved resolution. Treatment modalities were found to be a factor that had a significant relation to the resolution of the lesion after receiving treatment ($p = 0.003$; Spearman test).

Conclusion: Treatment of callus and clavus has shown satisfactory results in our center. Excision was found to be the most preferred method, with 80% resolution observed during 1 month. The treatment choice was found to be significantly related to the resolution of the lesion after receiving therapy.

Keywords: Corns, hyperkeratotic, resolution, therapy.

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INTRODUCTION

Clavus and callus result from a continuous mechanical action on the skin. The incidence was reported to affect about 20% of the general population of all ages and genders.^{1,2} Morbidities of callus and clavus such as pain, gait and balance abnormality, and adverse cosmetic effects, lead to motivation for physician care visits.² Varies treatment modalities, from invasive to non-invasive approaches, are available, but little is known about factors that contribute to the resolution of the lesion after receiving therapy, such as age, gender, location of the lesion, comorbidities, or treatment modalities, thus result from the lack of strictly defined therapeutic standards for the patients.

A study on clavus and callus has never

been done before in the Tumor and Skin Surgery Division of the Dermatology and Venereology Outpatient Unit, Dr. Soetomo General Academic Hospital Surabaya. This study aimed to evaluate the contributing factors related to the resolution of callus and clavus after receiving treatment, such as age, gender, lesion type, lesion location, and its treatment in the Tumor and Skin Surgery Division of the Dermatology and Venereology Outpatient Unit, Dr. Soetomo General Academic Hospital Surabaya during January 2016-December 2020.

METHODS

This retrospective cross-sectional observational study aims to evaluate the contributing factors related to the resolution of callus and clavus after

receiving therapy. Purposive sampling was used to recruit 25 samples for the study. The inclusion criteria are subjects were patients who were clinically diagnosed with callus and clavus who were treated and observed for 1 month in the Tumor and Skin Surgery Division of the Dermatology and Venereology Outpatient Unit, Dr. Soetomo General Academic Hospital Surabaya from January 2016 - December 2019. The exclusion criteria are incomplete medical records and cases with secondary infection. The descriptive data included the clinical characteristics of gender, age, type of lesion (callus or clavus), location of the lesion, management, and the resolution of the lesion observed during 1 month after receiving therapy. Factors contributing to the resolution of the lesion were identified and analyzed using the

SPSS version 17 program. This research has been through the Ethics Committee review in Dr. Soetomo General Academic Hospital Surabaya with reference number: 0462/LOE/301.4.2/V/2021.

RESULTS

The total number of callus and clavus patients in the Tumor and Skin Surgery Division of the Dermatology and Venereology Outpatient Unit, Dr. Soetomo General Academic Hospital Surabaya, for the period January 2016-December 2019 was 74 patients, 25 (33.73%) patients finished their treatment and recruited to the study. Forty-nine (66.72%) did not complete or refused further treatment and were excluded. The most common types of lesions were clavus (20 [80%]) over callus (5 [20%]). Table 1 shows the description of callus and clavus cases that were recruited for the study. Among 25 subjects, 13 (52%) were male, and 12 (48%) were female. Age was differentiated according to WHO age classification and most subjects were adults (13 [52%]). The distribution of lesion locations in both cases was mostly found in the lower extremities (20 [80%]). Out of the 25 subjects, 21 underwent excision (84%). Out of all patients who received treatment, 20 cases (80%) were resolved.

Using the Spearman correlation test, we determined the relationship between factors related to the resolution of the lesion (type of lesion, gender, age, location of the lesion, and treatment) with the resolution after receiving treatment (Table 2). The significant relationship was defined when the p -value < 0.05 . In our study, the treatment of the lesion was the only significant factor related to the resolution of the lesion after receiving treatment, with p -values was 0.003 respectively.

DISCUSSION

The callus is a non-penetrating circumscribed hyperkeratotic induced by the pressure that can act as a painful physical irritant. Callus must be differentiated from clavus, which has a penetrating subjacent structure (core) that irritates the sensory nerves from the papillary dermis, and by mechanical trauma.^{4,5} In our study, clavus dominated

most of the cases. The core of the clavus needs to be removed to provide prompt relief. On the other hand, callus is often more asymptomatic, and in most cases, simply eliminating the source of friction or pressure can make callus disappear by itself.⁴

The majority of our subject study was male, but the number was almost equal. This was not in line with previous studies that the majority of their subjects were female.^{5,6} Both sexes can have the same need to seek treatment due to symptomatic clavus or callus because pain can cause disruption of daily activities. Adults dominated both cases in our study (52%). The high level of physical activity of adults in their productive age can lead to repetitive, excessive shear forces and pressure in specific skin sites.² Some people with specific occupations, such as athletes, music instruments players, or construction workers, may develop hyperkeratotic lesions in specific skin

sites, which exposes the frictions over a long period of time.¹

The lower extremities were found to be the most sites of callus and clavus in our subjects (80%). This was in line with Gungor et al. in 2014.⁷ It is estimated that approximately 20% of the general population suffers from hyperkeratotic lesions induced by mechanical trauma, which are distributed mostly on the foot and toes.¹ The feet are designed to bear body weight when standing, walking, climbing stairs, running or jumping. These phenomena could lead to local irritation, mechanical damage to the skin of the feet, and hyperkeratosis will form as a response.² Lesions on the feet were proven to reduce the QoL when they cause pain and balance disorder, so the patient comes to seek treatment.⁸

Excision was the most preferred method in our study (90,5%). Excision is the most usual treatment performed in clinical practice for treating symptomatic callus

Table 1. Description of callus and clavus cases which were treated and controlled at least 1 time after therapy for a period of 1 month at the Tumor and Skin Surgery Division of the Dermatology and Venereology Outpatient Unit, Dr. Soetomo General Academic Hospital Surabaya during January 2016 - December 2019.

Case types	Callus (%)	Clavus (%)	Total (%)
Case distribution	5 (20.0)	20(80.0)	25(100)
Gender			
Male	3(60)	10(50)	13(52.0)
Female	2(40)	10(50)	12(48.0)
Age			
Infant	0 (0)	0 (0)	0 (0)
Children	0 (0)	2 (10.0)	2 (8.0)
Adolescent	1 (20.0)	5 (25.0)	6(24.0)
Adult	2 (40.0)	11(55.0)	13(52.0)
Elderly	2 (40.0)	2 (10.0)	2(16.0)
Lesion location			
Face	0 (0)	0 (0)	0 (0)
Upper extremity	2 (40.0)	1 (5.0)	3(12.0)
Lower extremity	3 (60.0)	17(85.0)	20(80.0)
Multiple	0 (0)	2 (10.0)	2 (8.0)
Treatment			
Excision	5 (100)	16(80)	21(84.0)
Cautery	0 (0)	0 (0)	0(0)
Cryotherapy	0 (0)	1 (5)	1(4.0)
TCA	0 (0)	2(10)	2 (8.0)
CO2 laser	0 (0)	0 (0)	0 (0)
Combination	0 (0)	1 (5)	1 (4.0)
Resolution rate			
Resolved	5 (100)	15(75)	20(80.0)
Unresolved	0 (0)	5 (25)	5(20.0)

Notes: TCA, trichloroacetic acid; CO2, carbon dioxide

Table 2. Analysis of the relationship between the type of lesion, gender, age, location of the lesion, treatment with the rate of callus and clavus resolution rate of the callus and clavus cases which were treated and controlled at least 1 time after therapy for a period of 1 month at the Tumor and Skin Surgery Division of the Dermatology and Venereology Outpatient Unit, Dr. Soetomo General Academic Hospital Surabaya during January 2016 - December 2019.

Factors	Unresolved (%) n=5		r	p
Lesion type				
Clavus	15(75.0)	5 (25.0)	0.250	0.228
Callus	5(100)	0 (0)		
Gender				
Male	12(92.3)	1 (7.7)	0.320	0.119
Female	8(66.7)	4 (33.3)		
Age				
Children	1 (50.0)	1 (50.0)	0.053	0.802
Adolescent	6 (100.0)	0 (0)		
Adult	9 (69.2)	4 (30.8)		
Elderly	4 (100.0)	0 (0)		
Lesion location				
Face	0 (0)	0 (0)	0.179	0.392
Upper extremity	2 (66.7)	1(33.3)		
Lower extremity	16(80.0)	4 (20.0)		
Multiple	2 (100.0)	0 (0)		
Treatment				
Excision	19(90.5)	2 (9.5)	0.565	0.003
Hefrycauter	0 (0)	0 (0)		
Cryotherapy	0 (0)	1 (100)		
TCA	0 (0)	2 (100)		
CO2 laser	0 (0)	0 (0)		
Combination	1 (100.0)	0 (0)		
Total	31(100)	25(100)		

and clavus due to its effectiveness, lack of complication, relatively inexpensive, and, if short term, as a preferred method of palliating the associated symptoms and serve significant reduction in pain as soon as demonstrated.^{2,5,9} Excision removes the core of the and reduces the focal pressure in the callus when it acts as a physical irritant.¹³ Hefrycauter, cryotherapy, Trichloroacetic Acid (TCA), carbon dioxide (CO₂) laser, and treatment combination usually do not resolve the lesion in one treatment and usually need repetition before the lesion is completely removed. Most of the lesions were resolved in our study (80%). This can be caused by the method performed mostly for both cases was excision that eliminates the whole lesion in one visit, regarded as resolved. Excision was reported to be able to reduce the pain significantly, focal stresses, and facilitate wound healing.^{3,5,10} Furthermore, excision is reported to have

a high recurrence rate.⁹ Previous studies found that without further intervention, a recurrence of symptomatology after callus and clavus removal by excision was normally observed within 6 to 12 weeks, but in this study, we only observed for 1 month.¹⁰ However, the remaining unresolved lesion in this study can be influenced by patients' failure to finish the treatment, compliance with treatment, failure to eliminate the trigger or other comorbid that were not reviewed in this study.

The analysis result of the relationship between treatment and resolution of the lesion was the only factor that was found significant in this study ($p = 0.003$, Spearman test). We had not found a significant relationship between the type of lesion, patient's gender, age, and location of the lesion, with a resolution of the lesion. A similar result was obtained in a previous study by Redmond et al. in 1999

that also found no significant relationship between gender of patients with resolution of callus or clavus who underwent scalpel debridement.¹⁰ Meanwhile, in a study conducted by VanHerpe and Mitchell in 1950-1960, the resolution rate of men was higher than women, and it was thought that women were more likely to use inappropriate footwear after therapy than men, which was the mechanical trigger for the recurrence of clavus or callus lesions.¹¹ Research by Redmond et al. in 1999 also found no significant relationship between age and resolution of callus and clavus, both measured by lesion resolution after excision and Visual Analog Scale (VAS).¹² Research by Gungör et al. in 2014 and Stephenson in 2016 also found no significant relationship between the location of the lesion and the resolution of the lesion. Gungör et al., in their retrospective study, found that 12 out of 17 clavus and callus patients had a complete recovery with no more clavus lesions on the hands and feet without any difference in healing in the two locations.^{7,13}

The significant relationship between treatment and the resolution rate of callus and clavus was the only factor found to be related to the resolution of the lesion in our study. Freeman, in his literature in 2002, stated that untreated callus and clavus cannot go away on their own and can become painful.¹⁴ Study by Woodburn J et al. in 2000 also reported a significant reduction in pain and plantar pressure after excision for painful plantar callosities.¹⁵ The importance of therapy in lesion resolution was also mentioned in a previous study by Lang et al. in 1994. The study compared 2 groups of clavus, one group was treated with a plaster containing 10% salicylic acid (SA), and the other group was only given a placebo-filled patch. The study reported that there was a significant difference in healing between the two groups. The group treated with plaster containing salicylic acid showed more effective healing than placebo.¹⁶ This may indicate the importance of treatment on clavus and callus healing.

The non-surgical approach is replacing surgical in treating clavus and callus. However, most of our study subjects preferred excision and experienced resolution within 1 month and significant

pain reduction thereafter. Excision has been reported to be able to provide prompt pain relief and faster wound healing. Firoz BF et al. in 2010 in their study had reported data indicating that linear closures produced less pain than flap closures, although these data did not reach statistical significance.¹⁷ Interestingly, a great number of patients in our center did not complete or refused further treatment. Avoiding surgery may have attendant disadvantages, including longer pain experience, slower lesion reduction, higher risk of infection, frequent failures, lack of adherence to conventional treatments, and treatment resistance, especially if clavus or callus, due to repeated friction and forces, forms fissure, local tissue hypoxia, bacterial colonization/infection, repeated ischemia-reperfusion injury, and cellular and systemic changes.¹⁸ As one of the goals of the clavus and callus treatment is to provide symptomatic relief. Excision can be offered to patients who expect an immediate effect. However, given the fact that cutaneous surgeries have outstanding safety profiles, making an evaluation of the patient in order to consider whether a surgery or non-surgery approach will be chosen is the first step to making the decision. Patient comorbidities such as the risk of bleeding, history of atrial fibrillation, pulmonary embolism, myocardial infarction, cerebrovascular accidents, deep venous thrombosis, and those post stent placement are a risk to be considered in order to prevent uncertainty regarding the risk of the surgery, poor satisfaction, and complication.¹⁹

The effectiveness of excision in managing painful callus and clavus also comes with the fact that most patient has their own perception of sharp scalpel debridement, especially regarding pain. Therefore, pain management pre-operatively, during, and following surgery is one of our priorities. Pain control can help speed the recovery and reduce the risk of developing certain complications after surgery. The local anesthetic injection is reported to be one of the most painful parts of minor surgery. Limiting discomfort during injection of local anesthetic before surgery can be achieved through choosing the type of local anesthetic, solution pH, solution temperature, needle size,

injection technique, consider using topical anesthetic cream, ice cooling, botox, and the distraction methods.²⁰ The technique of anesthesia performed in our clinic according to the availability of our setting are by using lidocaine solution, a small gauge syringe, and needle insertion at a 90° angle, pulling the needle before the administration of the solution, and slower injection rate in order to lower the pain experience. Lidocaine is preferred rather than lidocaine premixed with epinephrine because the former has closer pH to physiologic level, thus helping decrease injection pain. Minimizing pain in lidocaine premixed with epinephrine can be achieved by buffering the solution, yet it is not available in our setting.²⁰ We use a smaller needle diameter, preferably 30 gauges or smaller, which is advantageous as there is a direct relationship between needle diameter and insertion pain.²¹ The insertion method, we do needle insertion at 90° rather than 45° angle to limit the transection of the dermis and dermal nerve to avoid pain.^{22,23} Stabilize the needle holding to reduce needle movement, injection of the needle to subcutaneous fat, pull the needle, then pause after injecting 0,5 ml of lidocaine, and then continue with slower the rate injection of lidocaine agent to help with the pain because it gives time for the agents to diffuse and block the nerve transduction of the stimulated fibers.²⁰

Excision is performed in sterile technique, elliptical cut 0,5 cm from the edge of the lesion to prevent wound tension and avoid secondary infection that can delay wound healing and pain during recovery. We also consider acute post-surgical pain, especially in patients with a painful callus or clavus lesion who previously had experienced pain. Paracetamol is a dose of 500 mg 3 times daily given to provide significant pain reduction for mild to moderate pain over 4-6 hours. Acetaminophen in doses of 500 mg to 1 gram is more recommended, but it was unavailable in our setting.

The physician cannot always predict a patient's desires and thus should not assume that patients would reject surgical treatment for their lesion. Preoperative education about the procedure of the treatment, pain physiology, and pain

management strategies may be helpful to reduce the patient's anxiety and impact the patient's treatment decision. We hypothesized that pain also might predict a patient's therapy choice. Physicians and patients in our study had chosen surgery more frequently, aside from its invasive procedure, and the majority had resolved with no complaint of pain during recovery observed during 1 month. This finding suggests that, first, medical decision-making is linked to the patient's perception of the procedure and, second, the amount of pain. If surgical for clavus and callus is worth the risk, then further research can be directed to the management of pain and surgical method for reducing the pain during the procedure. Patients are most willing to choose surgery if short-term pain reduction effects can be gained as soon as the procedure and if they experience a less painful surgical procedure.

There are several limitations to our study. The first limitation was our study is a cross-sectional design that is not the best way to examine a causal relationship. Our second limitation was being a retrospective design, and we could not obtain exact information about patients' clinical data and previous history. Thus, we could not analyze the relationship between lesion size, lesion trigger, and patient's comorbid. The third limitation was there are still no resolution criteria for callus and clavus. Further investigations with prospective design might overcome these limitations. In conclusion, treatment was the only factor that contributed to the resolution of the lesion, which was observed during 1 month after therapy. To the best of our knowledge, this is the first clinical study to evaluate contributing factors to the resolution of the callus and clavus after treatment. Hence, further research with a longer period might focus on the other factor that has not been evaluated in this study that might influence callus and clavus resolution after treatment.

CONCLUSION

The treatment outcome of clavus and callus in our clinic had shown satisfactory results, with 80% resolution. The treatment modality is the only factor that was significantly related to the patient's recovery rate. In this study, excision for

treating clavus and callus also served quick symptomatic relief and gave resolution we observed during 1 month. Further studies with standard resolution criteria of clavus and callus lesion, larger sample sizes, and a longer period of observation are needed to achieve more optimal study results.

The main goal of the management of clavus and callus is to provide symptomatic relief, determine mechanical etiology, conservative treatment, and consider surgery if conservative treatment fails.²³ For instance, given that patients presenting with a painful callus or clavus who expect immediate relief can be offered surgical intervention. Conversely, the non-invasive method is chosen for patients that are not preferable to surgery, have a less painful lesion, or have comorbid that risk the wound healing after surgery.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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ETHICAL CLEARANCE

This research has been through the Ethics Committee review in Dr. Soetomo General Academic Hospital Surabaya with reference number: 0462/LOE/301.4.2/V/2021.

AUTHOR CONTRIBUTION

All authors contributed to the study, including conceptual framework, design, data collection, and data analysis to report study results for publication.

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