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Research Paper

Investigation of Hypertrichosis After Casting of Limb Fractures in Patients Referred to the Orthopedic Department of Rasoul Akram Hospital in 2019

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ABSTRACT

Background and Objectives: Acquired local hypertrichosis occurs unilaterally in the same organ, causing asymmetry and beauty-related issues. This study investigates the prevalence of hypertrichosis after the casting of limb fractures, addressing patient concerns, preventive measures, and timely treatment.

Methods: In this prospective cohort study, 82 patients who were hospitalized in the orthopedic department of Hazrat Rasul Akram educational, research and treatment complex in 2019 and required limb casting due to fractures or trauma were included. Demographic and clinical information of the patients were collected through interviews or by consulting the patient's clinical file. The severity of the trauma and the presence of hypertrichosis were also determined by clinical examination.

Results: Out of a total of 82 participants in the study, 41(50%) were male and 41(50%) were female. The mean age was 41.04±22.14 years. The mean duration of casting was 4.65±1.02 weeks. Meanwhile, 80(97.6%) people had undergone plaster casting once; however, 43 people (52.4%) had minor fractures. The most commonly injured site was the distal tibia, accounting for 30.48% of cases. The patients with hypertrichosis and patients without hypertrichosis were the two study groups, and the mean age in each group was significantly different from the other (P=0.0001); however, no other significant relationships or differences were discovered (P>0.05).

Conclusion: The incidence of hypertrichosis in Iranian society is 8.5%, which is slightly lower compared to other societies. Younger patients in Iran are more susceptible to developing hypertrichosis after limb casting of broken limbs.

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1. Introduction

Hair growth is a complex process that many factors, including environmental and internal stimuli, can affect by changing the blood supply and metabolism of the hair follicles. These stimuli cause hair growth in a part of the body to be thicker and longer than the standard amount in the same part according to age, gender, or race. Excessive and abnormal growth of body hair occurs in two disorders, hypertrichosis and hirsutism [1]. Hirsutism refers to the abnormal growth of body hair with a male pattern in women and children, which is not investigated in this study.

Hypertrichosis refers to excessive and abnormal growth of vellus hair that occurs for any reason and is independent of the effect of androgens. Hypertrichosis may be localized or diffuse, and acquired or congenital [2]. Acquired locally is one of the typical types of hypertrichosis, which is usually caused by inflammation and skin hyperemia, as a result of infections and trauma [1] or even vaccine injection [3].

Since opening the cast of broken limbs, hypertrichosis has been observed in the mentioned limb, hyperemia and inflammation caused by trauma and fracture or changes in vascularity following bone fixation and surgery is responsible for this acquired local hypertrichosis [1, 4].

This type of hypertrichosis is caused in many cases by the casting of limbs. Although it is reported in a few cases and is less known to general practitioners and dermatologists, it is well-known to surgeons and orthopedic specialists [1, 5].

This type of hypertrichosis is reversible and the thickness and amount of body hair returns to its original state after a period. Also, according to previous studies in this field, a longer duration of body cast leads to more time required to resolve hypertrichosis in the mentioned limb [6].

Since acquired local hypertrichosis occurs unilaterally in the same organ, it causes asymmetry and causes problems in terms of beauty. Accordingly, it is necessary to investigate the prevalence of hypertrichosis after the casting of broken limbs to resolve the concerns of patients in case of occurrence, preventive measures, and timely treatment.

2. Methods

This prospective cohort study was conducted in the orthopedic department of Hazrat Rasul Akram educational, research and treatment complex to investigate hypertrichosis after limb casting for fractures. Sampling was carried out consecutively, and patients who had visited the orthopedic department of Hazrat Rasul Akram educational, research and treatment complex due to limb trauma (without limitation of upper or lower limbs) in 2019 and required casting were evaluated.

The inclusion criteria were as follows: The absence of localized or generalized hypertrichosis in the patient before entering the study and the need for casting on one of the limbs without trauma or damage in the opposite limb requiring casting.

The exclusion criteria included the patient's unwillingness or lack of consent to participate in the study and failure to attend to cast removal appointment.

All patients who met the inclusion criteria were included in the study. Demographic and clinical information, including age, sex, history of surgery on the affected limb, number of casts, and duration of casts were collected through interviews or by referencing the patient's clinical file and the severity of the trauma and the presence or absence of hypertrichosis was also determined through clinical examination.

The data were then entered into the SPSS software, version 24 for analysis. The results for quantitative variables were expressed as Mean±SD, while categorical qualitative variables were presented as percentages. A relevant statistical test was employed to compare and examine the relationship between various components. Quantitative variable comparisons were performed using the t test. In cases of non-normal distribution, the Mann-Whitney test was employed. Qualitative variable comparisons were conducted using the chi-square test or the Fisher exact test. The significance level for all tests in this study was set at 0.05, with a confidence interval of 95%.

This study was conducted following the principles of medical ethics. Before commencing the study, informed consent was obtained from all patients. The names of the participants were not disclosed, no interventions were performed, and no additional costs were imposed on the participants.

3. Results

Demographic and clinical data of all patients are provided in Table 1.

The mean age in the two study groups was significantly different from each other in terms of hypertrichosis status (P=0.0001). Patients with hypertrichosis were significantly younger than patients without hypertrichosis. No significant relationship or difference was found regarding other variables (P>0.05) (Table 2).

4. Discussion

There have been few studies with a large number of patients on this subject, although a few cases of post-cast hypertrichosis have been reported [8-10].

Out of the 82 participants in this study, only 7 patients exhibited hypertrichosis after casting (8.5%). In contrast, Akoglu et al. (2012) reported a rate of 34.2% [7]. The mean age of all patients in this study was 41 years, whereas the mean age of the 7 individuals with hypertrichosis was 10.57±4.75 years. Notably, all patients with hypertrichosis belonged to the children and adolescents age group. Furthermore, a significant difference in the mean age of the two groups was observed (P=0.0001), which is in line with the findings of Akoglu et al. [7].

Gender distribution was balanced in our study, with an equal number of men and women, thus mitigating gender-related biases.

Among the 7 patients with hypertrichosis, 6(85.7%) were women, whereas the gender distribution among the 75 patients without hypertrichosis was nearly equal and close to each other. The comparison revealed no significant difference between the two groups in terms of gender (P=0.109).

The mean casting duration was approximately 4.6 weeks, equivalent to about 32 days. The group with hypertrichosis had a mean casting duration of about 3 days longer than the group without hypertrichosis, even though this difference lacked statistical significance (P=0.307). Notably, Agoklu et al. also did not observe any significant difference in this regard [7]. According to a study conducted by Chairerg et al. (2014) on 14 patients, cast application for 4 weeks can significantly stimulate hair growth [11].

Regarding the frequency of casting, only two of the 82 patients participating in the study had been plastered twice, and both of them belonged to the group without hypertrichosis. All individuals with hypertrichosis had been plastered only once, indicating no significant difference between the two groups in this regard (P=1.000). This result is in line with the findings of the study by Agoklu et al. [7].

The frequency of history of surgery on the affected limb was slightly different between the two groups. In the group with hypertrichosis, the number of people with no history of surgery was equal to the number of people who had undergone surgery once. In contrast, in the group without hypertrichosis, the number of people without a history of surgery was more than twice the number of individuals who had a history of surgery only once.

Regarding the condition and severity of the trauma, the highest frequency in the group without hypertrichosis was related to minor fractures, accounting for 53.3%. In the group with hypertrichosis, the number of individuals with minor fractures and those with high-energy fractures was equal. No significant difference was observed between the two groups in this aspect (P=0.360).

The location of injury in individuals with hypertrichosis had different distributions; however, 6 out of 7 individuals had injuries in the upper limbs. In the group without hypertrichosis, this matter was slightly different, with the percentage of upper limb injuries being almost equal to the lower limb injuries.

5. Conclusion

The incidence of hypertrichosis in Iranian society is slightly lower than in other societies, standing at 8.5%. Younger patients in Iran are more susceptible to developing hypertrichosis after limb casting for fractures.

Study limitations

One of the limitations of this study, when compared to previous studies, is the absence of long-term follow-up of the patients to determine the mean time for hypertrichosis resolution. Additionally, measurements of indicators, such as hair length, diameter, and density after casting were not conducted. Therefore, it is recommended that future studies with a larger sample size, longitudinal design, and longer follow-up duration be conducted to address these aspects.

Table 1. Demographic and clinical data of all patients in the study

Variables		No. (%)/Mean±SD
Gender	Male	41(50)
	Female	41(50)
Age (y)		41.04±22.14
Duration of casting (w)		4.65±1.02
Casting frequency	One time	80(97.6)
	Two times	2(2.4)
Location of trauma	Proximal of humerus	5(6.1)
	Distal of humerus	4(4.9)
	Distal of the humerus and proximal ulna	2(2.4)
	Proximal of ulna	5(6.1)
	Distal of ulna	5(6.1)
	Proximal of radius	1(1.2)
	Distal of radius	12(14.6)
	Proximal and distal radius	1(1.2)
	Proximal of ulna and radius	1(1.2)
	Distal of ulna and radius	2(2.4)
	Distal of radius and metacarpal	1(1.2)
	Second and third metacarpal	1(1.2)
	Proximal of femur	5(6.1)
	Distal of femur	1(1.2)
	Proximal of tibia	6(7.3)
	Distal of tibia	25(30.5)
	Distal of tibia and fibula	4(4.9)
	Second and third metatarsal	1(1.2)
History of surgery on the affected limb	No history of surgery	49(59.8)
	One time	25(30.5)
	Two times	6(7.3)
	Three times	2(2.4)
Severity of trauma	Minor	43(52.4)
	Low energy	21(25.6)
	High energy	18(22)
Hypertrichosis	Yes	7(8.5)
	No	75(91.5)

Figure 1. A 14-year-old boy with hypertrichosis of right lower limb after 6 weeks of long leg casting following a proximal tibial fracture

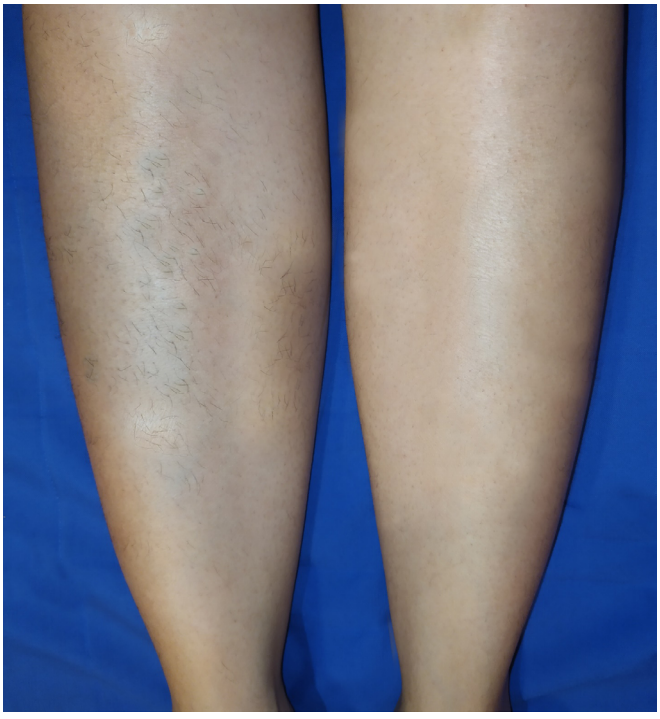

Figure 2. A 13-year-old girl with hypertrichosis of right lower limb after 6 weeks of long leg casting following a distal tibial fracture

Table 2. Comparison of demographic and clinical data between patients with or without hypertrichosis

Variables		No. (%)/Mean±SD		P
		Hypertrichosis		
		Yes	No	
Gender	Male	1(14.3)	40(53.3)	0.109
	Female	6(85.7)	35(46.7)	
Age (y)		10.57±4.75	43.88±20.95	0.0001
Duration of casting (w)		4.92±1.01	4.62±1.03	0.307
Casting frequency	One time	7(100)	73(97.3)	1.000
	Two times	0(0)	2(2.7)	
Location of trauma	Proximal of humerus	1(14.3)	4(5.3)	0.219
	Distal of humerus	0(0)	4(5.3)	
	Distal of the humerus and proximal ulna	1(14.3)	1(1.3)	
	Proximal of ulna	1(14.3)	3(4)	
	Distal of ulna	0(0)	5(6.7)	
	Proximal of radius	0(0)	1(1.3)	
	Distal of radius	1(14.3)	11(14.7)	
	Proximal and distal radius	0(0)	1(1.3)	
	Proximal of ulna and radius	0(0)	1(1.3)	
	Distal of ulna and radius	1(14.3)	1(1.3)	
	Distal of radius and meta-carpal	0(0)	1(1.3)	
	Second and third meta-carpal	0(0)	1(1.3)	
	Proximal of femur	0(0)	5(6.7)	
	Distal of femur	0(0)	1(1.3)	
	Proximal of tibia	1(14.3)	5(6.7)	
	Distal of tibia	1(14.3)	25(33.3)	
	Distal of tibia and fibula	0(0)	4(5.3)	
	Second and third metatarsal	0(0)	1(1.3)	
History of surgery on the affected limb	No history of surgery	3(42.9)	46(61.3)	0.695
	One time	3(42.9)	22(29.3)	
	Two times	1(14.3)	5(6.7)	
	Three times	0(0)	2(2.7)	
Severity of trauma	Minor	3(42.9)	40(53.3)	0.360
	Low energy	1(14.3)	20(26.7)	
	High energy	3(42.9)	15(20)	

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethical Committee of the Iran University of Medical Sciences (Code: IR.IUMS.FMD.REC.1398.350).

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Authors' contributions

Study design: Ali Yeganeh; Supervision and Writing the original draft: Amir Ebrahimzadeh Babaki; Data collection and data analysis: Anahid Bagheripour; Final approving: All authors.

Conflict of interest

The authors declared no conflicts of interest.

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