

# Dermatological Complications in Pediatric Orthopedic Casts: A Single-Center Prospective Study

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**Disclosures:** None.

**INTRODUCTION:** The pediatric population experiences one of the highest rates of bone fractures compared to other age groups and cast immobilization remains an essential, non-operative treatment option. The occlusive nature of casts may give rise to dermatological complications, with soiled or wet casts increasing complication risks, leading to treatment delays and a higher economic burden for patients. Current literature is limited as to the true incidence of skin complications, and whether pre-existing dermatologic conditions or moisture exposure influence the development of complications in the pediatric setting; therefore, our study at a pediatric orthopedic clinic investigated the incidence of dermatological complications following casting with a special consideration for moisture involvement and history of chronic dermatologic conditions.

**METHODS:** We conducted a single-center prospective study of 200 pediatric patients (<18 years) undergoing standard of care cast removal between August–December 2024. Approval was obtained by an Institutional Review Board with verbal consent and assent collected as appropriate. Exclusions included >18 years old, cast applied elsewhere besides our institution, indication of clubfoot, or open reduction surgery. At the time of cast removal, at least one of the study personnel performed a skin examination and documented the presence of any dermatologic complications. Retrospective data on demographics, cast type, mechanism of injury, water/sweat exposure, and history of atopic dermatitis, psoriasis, or urticaria were collected. Chi-square analyses assessed associations between moisture exposure and dermatological history with skin complications.

**RESULTS:** Of 200 enrolled patients ( $\bar{x}_{age} = 8$  years; 56.5% male and 43.5% female), the racial composition was predominantly Caucasian (77%), forearm fractures were the most common injury type (59.5%), and long arm casts were the most frequently applied (50%). 31 (15.5%) had dermatologic complications. The documented skin findings included erythema (n=24), pruritus (n=8), maceration (n=2), and blistering (n=1). Water/sweat exposure was reported in 17 patients (8.5%) and was significantly associated with skin complications ( $\chi^2(1, N=200)=21, p<0.001$ ). Fifteen patients (7.5%) had histories of atopic dermatitis (n=13), psoriasis (n=1), or urticaria (n=1), but it showed no significant association with skin complications ( $\chi^2(1, N=200)=1.5, p=0.21$ ).

**DISCUSSION:** Our observed incidence (15.5%) significantly exceeds previously reported rates (~1.4%), potentially due to detailed post-cast skin examinations and underreporting in prior studies. Moisture exposure was found to be associated with cutaneous issues, emphasizing the importance of family education on cast care and moisture avoidance. No increased risk was found among patients with pre-existing dermatologic conditions, suggesting standardized skin assessments are warranted for all cast removals. This study is limited in generalizability due to its single-site nature and relatively homogenous population. Additionally, the duration of casting in our population typically ranged from two to four weeks, which may have limited our ability to capture the full extent of potential complications.

**SIGNIFIANCE/CLINICAL RELEVANCE:** This study addresses an underrecognized barrier in pediatric orthopedic care. By identifying a higher-than-expected rate of dermatologic complications and linking them to moisture exposure, the findings support routine skin evaluations and caregiver education to prevent avoidable complications, improve outcomes, and potentially inform changes in casting protocols and materials.

**Table 1. Patient Demographics**

Demographic Variable	Count (N=200)	Percent (%)
<b>Sex</b>		
Male	113	56.5
Female	87	43.5
<b>Age (years)</b>		
<1	6	3
1	3	1.5
2	16	8
3	4	2
4	15	7.5
5	15	7.5
6	20	10
7	11	5.5
8	10	5
9	21	10.5
10	16	8
11	13	6.5
12	16	8
13	7	3.5
14	13	6.5
15	10	5
16	2	1
17	2	1
<b>Race</b>		
Unknown	1	0.5
Caucasian/White	154	77
Black	31	15.5
Asian	6	3
Hawaiian/Pacific Islander	1	0.5
Mixed	7	3.5
<b>Ethnicity</b>		
Not Hispanic	128	64
Hispanic	72	36

**Table 2. Injury Characteristics**

Injury Characteristic	Count (N=200)	Percent (%)
<b>Mechanism of Injury</b>		
Sports-related	38	19
Fall on Outstretched Hand	13	6.5
Ground-level Fall	48	24
Fall from Height	44	22
Vehicle-related	18	9
Initiated by Jump	9	4.5
Intentional Trauma	17	8.5
Unintentional Trauma	13	6.5
Unknown	1	0.5
<b>Cast Type</b>		
Short Arm Cast	39	19.5
Long Arm Cast	101	50.5
Short Leg Cast	6	3
Left Leg Cast	20	10
Thumb Spica	7	3.5
Ulnar Gutter	26	13
Other	1	0.5
Non-Weight Bearing Lower Extremity Casts	26	13
<b>Injury Type</b>		
Right Upper Extremity Fracture	82	41
Metacarpals and Phalanges	20	10
Carpus	0	0
Radius and Ulna	57	28.5
Humerus	5	2.5
Left Upper Extremity Fracture	87	43.5
Metacarpals and Phalanges	13	6.5
Carpus	1	0.5
Radius and Ulna	62	31
Humerus	11	5.5
Right Lower Extremity Fracture	11	5.5
Metatarsals and Phalanges	0	0
Malleoli	2	1
Tibia and Fibula	8	4
Femur	1	0.5
Left Lower Extremity Fracture	16	8
Metatarsals and Phalanges	0	0
Malleoli	1	0.5
Tibia and Fibula	15	7.5
Femur	0	0
Non-fracture	4	2

**Table 3. Dermatologic Factors**

Dermatologic Factor	Count	Percent (%)
<b>Water or Sweat Exposure</b>		
N=201		
None	184	92
Water	6	3
Sweat	11	5.5
Other	0	0
<b>Dermatological History</b>		
N=200		
None	185	92.5
Atopic Dermatitis	13	6.5
Urticaria	1	0.5
Psoriasis	1	0.5
<b>Skin Complications</b>		
N=204		
None	169	84.5
Erythema	24	12
Pruritus	8	4
Abrasion	0	0
Maceration	2	1
Ulceration	0	0
Foreign Body	0	0
Allergy	0	0
Blister	1	0.5
Other	0	0