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Epidemiology of Preschool-Age Children Presenting to the Orthopaedic Clinic with Limping

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Hip/Lower Extremity

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Abstract

Background: Limping in preschool-age children is a common chief complaint in the orthopaedic clinic. Given the breadth of limping etiologies, there is variability in the evaluation of these patients. The objectives of our study are: 1) to describe the epidemiology of preschool-age children presenting with limp and 2) to determine predictors identifying children at risk for non-benign etiologies.

Methods: This is a retrospective study of children <6 years old presenting to a tertiary care pediatric orthopaedic clinic with a chief complaint of limping from 1/1/2019 to 12/31/2020. Subjects were identified from the electronic medical record using natural language processing. Exclusion criteria included: limp >3 weeks, lower extremity fracture or surgery <12 weeks, or chronic conditions affecting the lower extremity (i.e., malignancy, neuromuscular disorder, sickle cell disease). Patient demographic and clinical characteristics were collected. Outcome diagnoses were classified as “benign,” “receiving advanced treatment (i.e., antibiotics, steroids, surgery),” or “inconclusive.” We calculated frequencies of outcomes and compared them using the Chi-square test. Bivariate analyses were conducted using Student’s t-test, the Mann-Whitney U-test, or chi-square test. We conducted a multivariable logistic regression analysis to determine predictors associated with the outcome of receiving advanced treatment vs. benign/inconclusive diagnoses while controlling for patient characteristics.

Results: We identified 169 children <6 years old with limping: 105 benign causes (62%), 27 receiving

advanced treatment (16%), and 37 inconclusive diagnoses (22%). The most common diagnoses among those receiving advanced treatment were juvenile idiopathic arthritis (8/27, 30%) and Lyme disease (7/27, 26%) (Table 1). On bivariate analysis, increased odds for requiring advanced treatment were identified for females (OR 2.8, 95% CI 1.20, 6.44) and presence of joint edema (OR 5.3, 95% CI 2.11, 13.47) (Table 2). Multivariate logistic regression found increased odds of receiving advanced treatment for females (OR 3.05, 95% CI 1.13, 8.24), joint edema (4.49, 95% CI 1.48, 13.61), and limp >9 days (OR 3.43, 95% CI 1.24, 9.51).

Conclusion: The majority of preschool-age children presenting with limp had benign diagnoses. Understanding predictors for specific etiologies of limping “receiving advanced treatment” may assist in standardizing care for preschool children with limping.

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Table 1. Patient and Diagnosis Characteristics

Characteristic	All subjects (N=169)		Advanced treatment (n=27)		Benign/inconclusive (n=142)		P
	Freq.	(%)	Freq.	(%)	Freq.	(%)	
Age at presentation (years; mean (SD))	3.3	(1.44)	3.5	(1.63)	3.3	(1.40)	0.57
Sex (% male)	110	(65%)	12	(44%)	98	(69%)	0.03
Diagnosis							
Juvenile idiopathic arthritis	8	(5%)	8	(30%)	0	(0%)	
Lyme	7	(4%)	7	(26%)	0	(0%)	
Other	6	(4%)	3	(11%)	3	(2%)	
Legg-Calves-Perthes disease	3	(2%)	3	(11%)	0	(0%)	
Reactive arthritis	2	(1%)	2	(7%)	0	(0%)	
Developmental dysplasia of the hip	1	(1%)	1	(4%)	0	(0%)	
Septic arthritis	1	(1%)	1	(4%)	0	(0%)	
Stress Fracture	1	(1%)	1	(4%)	0	(0%)	
Kohler disease	1	(1%)	1	(4%)	0	(0%)	
Transient synovitis	64	(38%)	0	(0%)	64	(45%)	
Toddler fracture	19	(11%)	0	(0%)	19	(13%)	
Soft tissue injury or contusion	9	(5%)	0	(0%)	9	(6%)	
Toddler fracture (foot)	6	(4%)	0	(0%)	6	(4%)	
Reactive synovitis	3	(2%)	0	(0%)	3	(2%)	
No conclusive diagnosis	38	(23%)	0	(0%)	38	(27%)	

Table 2. Presentation and Clinical Characteristics by Diagnosis Category

Characteristic	All subjects (N=169)		Advance treatment (n=27)		Benign/ inconclusive (n=142)		P
	Freq.	(%)	Freq.	(%)	Freq.	(%)	
Laterality							0.39
Left	71	(42%)	14	(52%)	57	(40%)	
Right	89	(53%)	11	(41%)	78	(55%)	
Unclear	9	(5%)	2	(7%)	7	(5%)	
Presenting location							0.26
Orthopaedic clinic	113	(67%)	15	(56%)	98	(69%)	
Urgent clinic	56	(33%)	12	(44%)	44	(31%)	
Previous treatment	143	(85%)	23	(85%)	120	(85%)	0.50
PCP	117	(81%)	19	(83%)	98	(82%)	>0.99
ED	31	(21%)	4	(17%)	27	(23%)	0.79
Duration of limp (<i>days; median (IQR)</i>)	5	(2-10)	6	(2-13)	5	(2-10)	0.39
Pain	90	(53%)	18	(67%)	72	(51%)	0.20
Morning stiffness	12	(7%)	4	(15%)	8	(6%)	0.25
Tick bite	3	(2%)	1	(4%)	2	(1%)	0.98
Previous infection	56	(33%)	11	(41%)	45	(32%)	0.49
<i>Upper respiratory infection</i>	34	(61%)	4	(36%)	30	(67%)	0.13
<i>Strep</i>	4	(7%)	0	(0%)	4	(9%)	0.71
<i>Flu</i>	4	(7%)	2	(18%)	2	(4%)	0.35
<i>viral infection</i>	7	(13%)	2	(18%)	5	(11%)	0.90
<i>Ear infection</i>	9	(16%)	2	(18%)	7	(16%)	>0.99
<i>Hand foot, and mouth disease</i>	2	(4%)	1	(9%)	1	(2%)	0.85
Minor trauma	28	(17%)	4	(15%)	24	(17%)	0.99
<i>Fall</i>	17	(57%)	3	(75%)	14	(58%)	0.94
<i>Blunt injury</i>	1	(3%)	1	(25%)	0	(0%)	0.30
<i>Sport/playground</i>	9	(30%)	0	(0%)	9	(38%)	0.36
Hx of refusal to bear weight	111	(66%)	16	(59%)	95	(67%)	0.59
Weight-bearing							0.50
No	12	(7%)	3	(11%)	9	(6%)	
Yes, fully	56	(33%)	6	(22%)	50	(35%)	
Yes, with limp	96	(57%)	18	(67%)	78	(55%)	
Yes, partially	3	(2%)	0	(0%)	3	(2%)	
Unknown	2	(1%)	0	(0%)	2	(1%)	

Table 2. Continued

Characteristic	All subjects (N=169)		Advance treatment (n=27)		Benign/ inconclusive (n=142)		P
	Freq.	(%)	Freq.	(%)	Freq.	(%)	
Swelling/edema	27	(16%)	11	(41%)	16	(11%)	<0.001
Skin sign	11	(7%)	2	(7%)	9	(6%)	>0.99
<i>Bruising</i>	3	(27%)	1	(50%)	2	(22%)	>0.99
<i>Rash</i>	3	(27%)	0	(0%)	3	(33%)	0.94
<i>Abrasions</i>	2	(18%)	0	(0%)	2	(22%)	>0.99
<i>Redness</i>	1	(9%)	1	(50%)	0	(0%)	0.39
<i>Warm to touch</i>	1	(9%)	0	(0%)	1	(11%)	>0.99
<i>Other</i>	1	(9%)	0	(0%)	1	(11%)	>0.99
Localized tenderness	33	(20%)	6	(22%)	27	(19%)	0.74
Time from limp onset to presentation (days; median (IQR))	5	(2-10)	6	(2-13)	5	(2-10)	0.42
Time from presentation to diagnosis (days; median (IQR))	0	(0-4)	4	(0-26)	0	(0-0)	<0.001
Time from presentation or follow-up (days; median (IQR); N=88)*	28	(12-197)	306	(31-655)	22	(8-58)	0.003

*The number in parentheses represents the number of patients with available data for the given characteristic. IQR, interquartile range; SD, standard deviation.