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Original Research Article

Evaluation of Imaging Study Results in Limping Patients Related to Hip

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Abstract

Limping is a common chief complaint among children while presenting to the orthopaedic clinics need medical attention and essential consultation from orthopaedic surgeon. To evaluate the imaging study findings of limping patients and their associated risk factors and causes related to hip joint.

80 patients with limping who referred from orthopaedic clinics to radiological clinic in Al-Hilla Teaching Hospital for imaging study of hip joints, between December 2010 and December 2015 were included in this study. Report information of the patient regarding name, age, sex, address, medical and family history and short examination of gait, hip joints and lower limbs. Then imaging study for hip joints done.

Clinically (26.3%) of patients had pain, meanwhile, (22.8%) of patients had unilateral pain. (78.8%) of patients had equal leg length and (75.0%) of patients had normal daily activity. (81.3%) had normal range of motion. (81.3%) of limping patients had positive findings by CT scan and MRI. (35.4%) of limping patients with positive finding had perthes disease.

Majority of limping patients related to hips appear positive finding by imaging studies, which lead to definitive diagnosis. In addition, the most common cause of limping related to hip joints in this study was perthes disease. Imaging studies (C-T scan, MRI) are good tools for diagnosis of limping patients related to hip causes

Key Words: Imaging study; CT; MRI; limping; Hip.

الخلاصة

العرج هو شكوى شائعة بين الأطفال اللذين يراجعون عيادات العظام والكسور والتي تحتاج إلى عناية طبية والتشخيص من قبل جراح العظام . الهدف من الدراسة هو لتقييم نتائج دراسة التصوير الطبي لمرضى العرج وتقييم عوامل الخطر المرتبطة بها وأسبابها المتعلقة بمفصل الورك .

المرضى وطريقة البحث : تم إدراج ٨٠ مريضا يشكون من العرج راجعو شعبة الأشعة في مستشفى الحلة التعليمي محالين من استشارية جراحة العظام والكسور لإجراء فحص الرنين المغناطيسي او المفراس لمفصل الورك للفترة بين ديسمبر ٢٠١٠ وديسمبر ٢٠١٥ في هذه الدراسة . تقرير معلومات للمريض بخصوص الاسم والعمر والجنس والعنوان والتاريخ الطبي للمريض والأسرة وفحص قصير للمشي ، ولمفصل الورك والأطراف السفلى ،ثم اجراء الفحص الخاص بالرنين المغناطيسي او المفراس او كلاهما .

النتائج: سريريا (٢٦.٣٪) من المرضى كان لديه ألم ،وفي الوقت نفسه، (٢٢.٨٪) من المرضى كانت الألم من جانب واحد . (٧٨.٨٪) من المرضى كان طولا لساقين متساوي و (٧٥.٠٪) من المرضى كان يمارس النشاط اليومي العادي . (٨١.٣٪) لديهم المعدل الطبيعي للحركة في مفاصل الوركين . كان (٨١.٣٪) من المرضى اظهر نتائج إيجابية (مرضية) من خلال الاشعة المقطعية والتصوير بالرنين المغناطيسي. كان (٣٥.٤٪) من المرضى الذين عانون من العرج كنتيجة لإصابتهم بمرض بيرتيس.

الغالبية العظمى من مرضى العرج المتعلقة بالورك تظهر النتيجة الإيجابية (مرضية) عن طريق التصوير الطبيب الرنين المغناطيسي او المفراس والتي تؤدي إلى التشخيص النهائي . وبالإضافة إلى ذلك ،فإن السبب الأكثر شيوعا للعرج المتعلق بمفاصل الورك في هذه الدراسة هو مرض بيرتيس . دراسات التصوير (التصوير بالرنين المغناطيسي، المفراس) هي أدوات جيدة لتشخيص مرضى العرج المتعلق بمفصل الورك.

الكلمات المفتاحية: التصوير الطبي، المفراس، الرنين، العرج، مفصل الورك.

Introduction

Refusal to walk or limping is a common chief complaint among children while presenting to the orthopaedic clinics need medical attention and essential consultation from orthopaedic surgeon [1]. Limping might result from pain, weakness or deformity and there is a wide range of causes that may produce a limp in childhood ranging from simple unfitted shoe to the first manifestation of life-threatening neoplasm [2, 3]. In order to confirm limping diagnosis we need to differentiate limping from physiologic and anatomical deformities that may lead to abnormal gait [4]. Although normal gait is a process of functional and healthy joints, muscles and bones as well as normal neurological system, however, majority of children who limp follow a benign course [1-3]. In a study done by Fischer and Beattie reported that 0.2% of children present to the emergency department ororthopaedic clinic complaint from limping each year. Two third of limping children were boys and majority of limping were unilateral [4]. Although, majority of limping children have been received in orthopaedic clinics after 2 to 3 days of their complaining from pain or refusal to walk. However, after performing an appropriate systematic history, a comprehensive physical examination and necessary laboratory testing and diagnostic imaging most of limping children are discharged without further adverse event [5]. The main concerns related to limping children are the wide spectrum of differential diagnosis for limping child which can range from slight pain due to sprains to neoplasm changes, therefore, orthopaedic surgeon are facing challenge about how to evaluate and manage limping child [5]. There are many serious diseases mimic in their presentations to simple causes of limping around hip joint which might include bone or joint septic arthritis, primary or metastatic tumours of bone, Perthes' disease and slipped femoral capital epiphysis (SFCE) as well as trauma [1-10]. Although, the importance of limping in children and its challenges to clinicians and parents, however, there is no information on the magnitude of limping and evaluating diagnosis and management.

This study has been carried out to evaluate the imaging study findings of limping patients and their associated risk factors and causes related to hip joint.

Materials and Methods

Study design/Study Location

This hospital-based cross-sectional study was carried out in a General Teaching Hospital.

Study population

80 patients with limping who received in radiological clinics referred cases from orthopaedic clinic for imaging study of hip joints, between December 2010 and December 2015 were included in this study. We report information of the patient regarding name, age, sex, address, medical history (specially the pain site, time, type, duration), family history and short examination for gait, hip joints and whole lower limbs. Then we did imaging study for hip joints.

All procedures performed in study involving human participants were in accordance with the Declaration of Helsinki in observing human rights.

Instruments and procedures

CT protocol for pelvis:

A) Whole pelvis (for any case that does not specify the SI joints)

"FAI" add oblique reformats, parallel to femoral necks. reformat slices 3mm Thick at 3mm Intervals in all 3 planes.

1) Straight Axial Reformats
2) Straight Coronal Reformats
3) Straight Sagittal Reformats

B) Judet Views (For every case with Acetabulum Fracture)
C) SI Joints: reformat 3mm thick at 3mm intervals
1) Oblique Coronal Reformats
2) Oblique Axial Reformats
MRI protocol for pelvis:

1- T1 TSE coronal 3 mm
2- T2 STIR coronal 3 mm
3- T1 TSE axial 3 mm
4- T2 STIR axial 3 mm
5- T2 TSE sagittal SFOV affected side.
6- PD fat sat axial oblique 3 mm SFOV affected side.

Statistical Analysis

Statistical analysis was carried out using SPSS version 20. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as means with their 95% confidence interval (CI). The Pearson's chi-square test (x^2) test was used to determine the associations between categorical variables. A *p*-value of ≤ 0.05 was considered as statistically significant.

Results

80 patients with limping have been referred from orthopaedic clinics to radiological clinic of teaching hospital for imaging study of hip joints. The overall mean age of patients was (14.95±4.33) years old, (31.3%) of patients were older than 16 years (Figure 1). (61.3%) of patients were males, meanwhile, (42.5%) of patients were from urban areas.

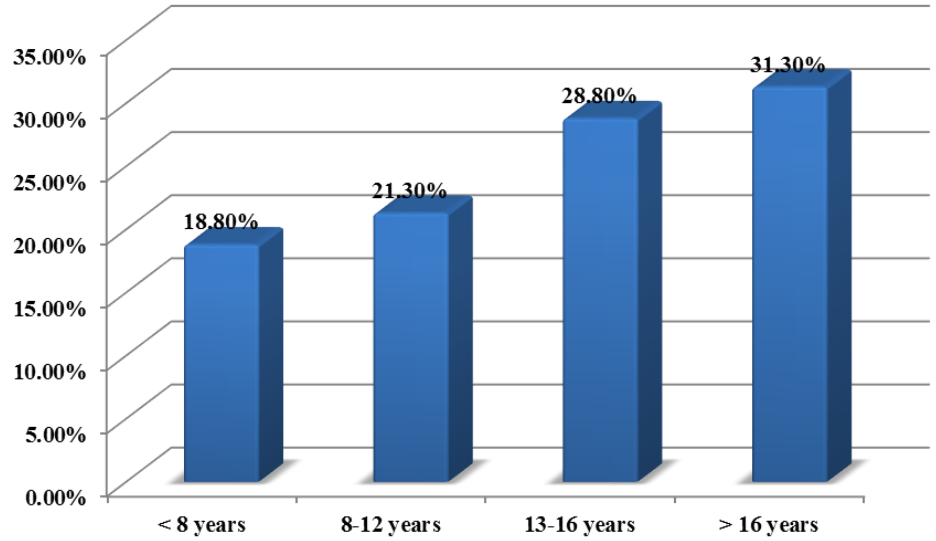

Figure 1: Distribution of patients with limping by age group

Distribution of Patients with Limping by Medical History

Table 1 shows the distribution of patients with limping by medical history. (36.3%) of patients had family history of neurological and musculoskeletal abnormalities, meanwhile, (31.3%) of patients had history of rickets. Only (25.0%) of limping patients had history of abnormal gait. (21.2%) and (26.3%) of limping patients had history of neuromuscular problems and history of structural abnormalities, respectively.

Table 1: Distribution of Patients with Limping by Medical History

Variable	Frequency (%)
Family history of neurological and musculoskeletal abnormalities	
Yes	29 (36.3%)
No	51 (63.7%)
History of rickets	
Yes	25 (31.3%)
No	55 (68.8%)
History of the gait	
Normal	60 (75.0%)
Abnormal	20 (25.0%)
History of neuromuscular problems	
Yes	17 (21.2%)
No	63 (78.8%)
History of structural abnormalities	
Yes	21 (26.3%)
No	59 (73.7%)

Distribution of Patients with Limping by Clinical Features

Table 2 shows the distribution of patients with limping by clinical features. (26.3%) of patients had pain, meanwhile, only (23.8%) of patients their pain awake them from sleep and (22.8%) of patients had unilateral pain. (78.8%) of patients had equal leg length and (75.0%) of patients had normal daily activity. (81.3%) had normal range of motion. (51.3%) of patients were complaining from pain for 2 years ago.

Table 2: Distribution of Patients with Limping by Clinical Features

Variable	Frequency (%)
Pain	
Yes	21 (26.3%)
No	59 (73.7%)
Sleep Disturbance	
Pain awake patients from sleep	19 (23.8%)
No	61 (76.2%)
Pain location	
Unilateral	18 (22.5%)
Bilateral	62 (77.5%)
Leg length	
Equal	63 (78.8%)
Different	17 (21.2%)
Daily activity	
Normal	60 (75.0%)
Abnormal	20 (25.0%)
Range of Motion	
Normal	65 (81.3%)
Abnormal	15 (18.7%)
Duration of pain	
< 2 years	39 (48.8%)
≥ 2 years	41 (51.3%)

Proportion of Limping Patients with Positive Radiological Findings

Figure 2 shows the proportion of limping patients with positive radiological findings. (81.3%) of limping patients had positive findings by CT scan and MRI.

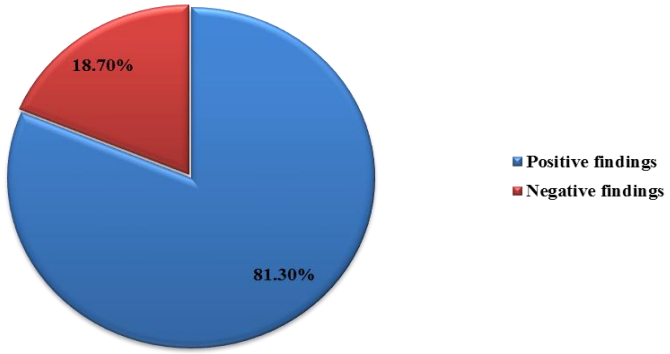

Figure 2: Proportion of Limping Patients with Positive Radiological Findings.

Causes of Limping by CT Scan and MRI

Figure 3 shows the distribution of patients with limping by causes. (35.4%) of limping patients with positive finding had perthes disease. Meanwhile, only (3.1%) of patients had developmental dysplasia of hip.

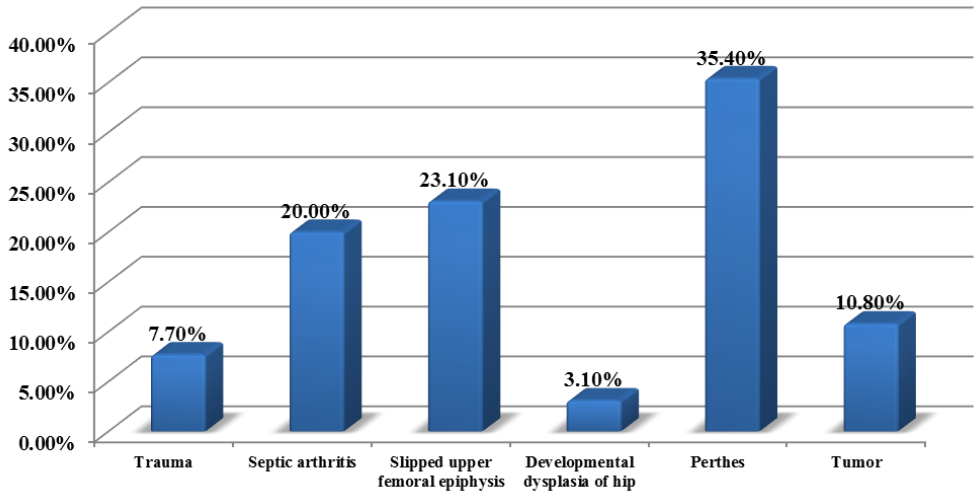

Figure 3: Causes of Limping by CT Scan and MRI

Association of CT Scan and MRI Finding by Age, Sex and Residence of Limping Patients

Table 3 shows the association of CT scan and MRI finding by age, sex and residence of limping patients. There was no significant associations of CT scan and MRI finding by age, sex and residence of limping patients.

Table 3: Association of CT scan and MRI Finding by Age, Sex and Residence of Limping Patients

Variable	CT Scan and MRI Finding		χ^2	*P* Values
	Positive (%)	Negative (%)		
Age Groups				
< 8 years	12 (18.5)	3 (20.0)		
9-12 years	14 (21.5)	3 (20.0)	0.257	1.000[a]
13-16 years	19 (29.2)	4 (26.7)		
> 16 years	20 (30.8)	5 (33.3)		
Sex				
Male	37 (56.9)	12 (80.0)	2.735	0.098
Female	28 (43.1)	3 (20.0)		
Residence				
Urban area	30 (46.2)	4 (26.7)	1.894	0.169
Rural area	35 (53.8)	11 (73.3)		

*p value ≤ 0.05 is significant
[a:] Fisher exact test

Association of CT Scan and MRI Finding by Medical History of Limping Patients

Table 4 shows the association of CT scan and MRI finding by medical history of limping patients. There were significant associations of CT scan and MRI finding by histories of rickets, gait, neuromuscular problems and structural abnormalities of limping patients.

Table 4: Association of CT scan and MRI Finding by Medical History of Limping Patients.

Variable	CT Scan And MRI Finding		χ^2	*P* values
	Positive (%)	Negative (%)		
Family history of neurological and musculoskeletal abnormalities				
Yes	25 (38.5)	4 (26.7)	0.734	0.392
No	40 (61.5)	11 (73.3)		
History of rickets				
Yes	17 (26.2)	8 (53.3)	**4.191**	**0.041***
No	48 (73.8)	7 (46.7)		
History of the gait				
Normal	53 (81.5)	7 (46.7)	**7.904**	**0.005***
Abnormal	12 (18.5)	8 (53.3)		
History of neuromuscular problems				
Yes	14 (21.5)	7 (46.7)	**3.975**	**0.046***
No	51 (78.5)	8 (53.3)		
History of structural abnormalities				
Yes	9 (13.8)	8 (53.3)	**11.356**	**0.001***
No	56 (86.2)	7 (46.7)		

*p value ≤ 0.05 is significant

Association of CT Scan and MRI Finding by Clinical Features of Limping Patients

Table 5 shows the association of CT scan and MRI finding by clinical features of limping patients. There were significant association of CT scan and MRI finding by pain, sleep disturbance and pain location.

Table 5: Association of CT scan and MRI Finding by Clinical Features of Limping Patients.

Variable	CT Scan And MRI Finding		χ^2	*P* values
	Positive (%)	Negative (%)		
Pain				
Yes	13 (20.0)	8 (53.3)	**6.995**	**0.008***
No	52 (80.0)	7 (46.7)		
Sleep Disturbance				
Pain awake patients from sleep	11 (16.9)	8 (53.3)	**8.922**	**0.003***
No	54 (83.1)	7 (46.7)		
Pain location				
Unilateral	12 (18.5)	6 (40.0)	**3.242**	**0.072***
Bilateral	53 (81.5)	9 (60.0)		
Leg length				
Equal	14 (21.5)	3 (20.0)	0.017	0.896
Different	51 (78.5)	12 (80.0)		
Daily activity				
Normal	15 (23.1)	5 (33.3)	0.684	0.408
Abnormal	50 (76.9)	10 (66.7)		
Range of Motion				
Normal	11 (16.9)	4 (26.7)	0.760	0.383
Abnormal	54 (83.1)	11 (73.3)		
Duration of pain				
< 2 years	31 (47.7)	8 (53.3)	0.155	0.694
≥ 2 years	34 (52.3)	7 (46.7)		

*p value ≤ 0.05 is significant

Discussion

Limping is the presentation of a hidden cause and a challenge for orthopaedic surgeons that may happen at any age, and the definitive diagnosis by careful history, physical examination and the use of imaging techniques is recommended. Many cases of limping children will pass with no diagnosis due to absence of severe illness and spontaneous resolution, meanwhile, worsen limping might be happened if there is delay in careful follow up and diagnosis [1, 4]. Limping can be a cause of previous trauma, infection, inflammation, tumour as well as congenital anomalies. However, determining the definitive pathology is the cornerstone in treating a limping child.

This study has found that the limping was increased at adolescent age group and more boys than girls were affected which reflect their more predispositions to trauma and other illness. However, it is difficult for young children to remember trauma and the time of injury as well as localization and development of pain tend to be unclear [11]. Majority of limping patients appeared to have positive radiological finding by CT scan and MRI. Although, most of limping patients experienced no pain, difficult to localized the pain and have no sleep

disturbance due to pain as well as appeared normal leg length with normal daily activity and wide range of motion but with duration of limping for more than two years duration. It is attributed to fact that, most of limping children presented on the day when symptoms started, meanwhile, significantly many cases of limping appeared a notable delay and late presentation to hospital due to absence of serious illness [12]. Furthermore, there were significant associations of CT scan and MRI Finding by pain, sleep disturbance and pain location which indicated that the feeling and site of pain is not a reliable indicator of the site of pathology. Although, there were significant associations of CT scan and MRI finding by histories of rickets, gait, neuromuscular problems and structural abnormalities of limping patients. However, majority of limping patients had no family history of neurological and musculoskeletal abnormalities as well as no history of neuromuscular and structural abnormalities or rickets and appeared normal gait.

There are several pathologies related to hip joint responsible for limping in children. This study reported that, (35.4%) of limping patients with positive finding had perthes, although its uncommon disease. However, it misdiagnosed with different causes of limping including trauma and developmental, inflammatory, and coagulation abnormalities [9]. Meanwhile, only (3.1%) of patients had developmental dysplasia of hip. Therefore, differentiating of normal developmental changes from disease states represents a difficulty in the diagnosis for orthopaedic surgeon.

Conclusions

1- Majority of limping patient related to hips appear to have positive finding by imaging studies which lead to definitive diagnosis.

2-most of limping patient presented for imaging studies in late stages of the disease because of absence of serious symptoms early.

3- the most common cause of limping related to hip joint in this study is perthes disease.

4- imaging studies (C-T scan, MRI) are a good tools for diagnosis of limping patients.

References

1. De Boeck H, Vorlat P. Limping in childhood. Acta Orthopædica Belgica,2003; 69 (4): 302-310.
2. Leet AI, Skaggs DL. Evaluation of the acutely limping child. Am Fam Physician. 2000; 15 (4):1011-8.
3. Flynn JM, Widmann RF. The limping child: Evaluation and diagnosis. J Am Acad Orthop Surg2001,; 9: 89-98.
4. Fischer SU, Beattie TF. The limping child: Epidemiology, assessment and outcome. J Bone Joint Surg,1999; 81-B: 1029-1033.
5. Herman MJ, Martinek M. The Limping Child. Pediatrics in Review,2015; 36 (5): 184-197.
6. Sawyer JR, Kapoor M. The Limping Child: A Systematic Approach to Diagnosis. American Family Physician,2009; 79 (3): 215-224.
7. Milla SS, Coley BD, Karmazyn B, et al. ACR Appropriateness Criteria Limping Child—Ages 0 to 5 Years. J American College of Radiology, 2012; 9 (8): 545-553.
8. Flynn JM, Mehta S. An evidence-based approach to the evaluation and management of hip pain in children. Pediat Case Rev., 2002; 2(1): 26-32.
9. Shirley ML, Laxer RM. Approach to Acute Limb Pain in Childhood. Paediatrics Rev, 2006; 27 (5): 170-180.
10. Humphreys RA. Child with a Limp–A Clinical Approach. Scott Univ Med J, 2013; 2 (2): 39-42.
11. Scottish Health Statistics. Information and Statistics Division. The Natinal Health Service in Scotland ISD Publication Edinburgh: 1996; 2.
12. Choban S, Killian JT. Evaluation of acute gait abnormalities in preschool children. J Pediatr Orthop,1990; 10:74-8.