

Epidemiological, Clinical And Radiological Aspects Of Fractures With Epiphyseal Separation Of The Ankle Children And The Teenagers In Dakar: 51 Study Cases

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Abstract

Objectives: to report epidemiological, clinical and radiological aspects of recent fractures with epiphyseal separation of the child's ankle.

Methods and Patients: It was a retrospective study carried out between January 1997 and December 2005, concerning 51 children and teenagers presenting with a recent fracture with epiphyseal separation of the ankle. The epidemiological aspects studied were age, sex, consultation time, aetiology and mechanism of the trauma. The clinical aspects included presenting complaints and signs of the physical exam. Standard x-ray was done, including face and profile incidences.

Results: The fracture mostly occurred among male children, aged 11 on average, and consulted 24 hours after the trauma. They were often the result of a direct mechanism during a traffic accident. On a clinical level, open fractures were common. On X-rays, the Salter and Harris type II was the most frequent. **Conclusion:** the diversity of the lesion is due to the violence of crash because they are almost all due to a traffic road accident.

INTRODUCTION

Epiphyseal separation of the ankle are continuity solution of the epiphyseal plate of the ankles bones. They represent about 5% of fractures in the child and 15% of all epiphyseal separation in the child [1,2,3,4]. Male children are mostly affected. There is an incidence peak between 8 and 15 years old. Epiphyseal separations are often due to an indirect trauma. The lesions found depend on the mechanism and age of the child, which means maturation of epiphyseal plates. Types I to IV Salter and Harris mostly occur among young children whereas triplane fractures and Tillaux fractures occur among the teenager in whom the closing of epiphyseal plate started [5,6,7]. The progress in imagery got the diagnostic easier and more accurate.

The objectives of this study were to find out epidemiological, clinical and radiological features of epiphyseal separation of the ankle in the child and teenager in an African country.

PATIENTS AND METHODS

Between January 1997 and December 2005, 51 children's files were collected for a retrospective study on a recent and traumatic epiphyseal separation of the ankle. All patients in whom epiphyseal plate was still present and seen with a period less than 21 days were included. Pathological epiphyseal separations were excluded. The studied epidemiological paradigms were age, sex, consultation time, cause and mechanism of the trauma. The clinical analysis took into consideration pain, functional impotence, physical signs like oedema, deformity and associated lesions. Imagery included standard X-rays of ankle in face and profile incidences. The Salter and Harris classification led to establish different types of fractures with epiphyseal separation of the ankle.

RESULTS

EPIDEMIOLOGICAL ASPECTS

The study included 44 boys and 7 girls, which means a sex-ratio of 6.28:1. They were on average aged 11, with

extremes of 1 and 19. Table I represents their age classification.

Figure 1

Table 1: Classification of patients according to their age

Age(years)	Number	Percentage
0-7	5	9.8%
8-15	41	80.4%
16-19	5	9.8%

Traffic road accidents (36 cases) were the most frequent, followed by game related- accidents (7 cases), sport accidents (4 cases) and domestic accidents (4 cases).The epiphyseal separation mechanism was direct in 35 cases and indirect in 16 cases. The time before consultation was 24 hours on average with extremes stretching from 1 hour to 20 days.

CLINICAL ASPECTS

All the patients suffered from pain and functional impotence. Both sides were affected in the same way with 27 fractures of the right ankle and 26 fractures of the left ankle. The ankle oedema was present among 46 children and missing among 5 children. In 41 children, the entire ankle was involved by oedema, and in 5 of them it was only the external malleolus. A deformity was present in 17 children: 8 in valgus, 7 in varus and 2 in external rotation. The physical examination of ankle revealed that pain was generalised among 28 children, localised at the internal malleolus in 5 children and at the external malleolus in 2 of them. In the others cases the localisation of pain was not reported. The most frequent associated lesions were open fractures (13 cases). Using the Gustillo classification we found out 1 type-I- fracture, 4 type-II- fractures, and 8 type-III- fractures. The other associated lesions included abrasions(7 cases), skull traumatism (1 case) and closed fractures (3 cases).

RADIOLOGICAL ASPECTS

Face and profile X-rays of patients' ankles were taken. The distribution of epiphyseal separation using the Salter and Harris classification is represented on table II.

Figure 2

Table 2: distribution of epiphyseal separation using the Salter and Harris classification

TYPE	LOCATION	NUMBER	PERCENTAGE
I.	Fibula	4	7.84%
	Tibia	13	25.5%
II.	Tibia	19	37.25%
	Tibia+fibula(type I)	03	5.88%
III.	Tibia	9	17.64%
	Tibia+fibula(type I)	1	1.96%
IV.	Tibia	2	3.93%
V.	-	0	0%

Among these fractures, 17 were displaced and all were localised on the tibia. The distribution of displaced fractures using the Salter and Harris classification is shown on table III.

Figure 3

Table 3: distribution of epiphyseal separation using their displacement

Type	Number	Percentage
I	6	21.42%
II	8	57.16%
III	2	14.28%
IV	1	7.14%

The long bones fractures were the most frequent associated lesions. The radiological associated lesions are shown on table IV

Figure 4

Table 4: Radiological associated lesions

Associated lesion	Number	Percentage
Fracture of the ipsilateral shaft of the fibula	17	73.90%
Fracture of the ipsilateral shaft of the tibia	2	8.70%
Fracture of both bones of the contralateral leg	1	4.35%
Fracture of the contralateral femur	1	4.35%
Ipsilateral ankle dislocation	1	4.35%
Fracture of the ipsilateral hand	1	4.35%

COMMENTS

EPIDEMIOLOGICAL ASPECTS

Our study shows no particularity about age and sex in

comparison to the literature data. But causes are different comparing to others series. In our series, traffic road accidents are the most frequent in opposition to the studies by Crawford [8], Gaubert [9], Toupin and Lechevalier [10], in which sport and game related-accidents are most frequent. The high incidence of road accidents could be explained by the irresponsibility of many drivers, driving car without any licence, or with defective brakes, and without respecting any traffic code. In many towns, promiscuity and the absence of specialized structures for children's games are factors which lead kids to be highly exposed to vehicles since children use streets as playgrounds. The mechanism of occurrence of epiphyseal separation is also different from the published reports. A direct mechanism is found in about 70% of cases in our study, comparing to Crawford's and Badelon's series in which the indirect mechanism is predominant. The high incidence of the direct mechanism in our series could be explained by the frequency of traffic accidents, the impact taking place directly on the ankle.

Patients are brought in consultation with delay in our context. This delay is due not only many mobility problems in town, but also because culturally, patients go first to see a traditional doctor before going to the hospital.

CLINICAL ASPECTS

All patients experienced pain and functional impotence. In a study on the pain felt in fractures of the child, Drendel [12] concluded that in bone traumatism the pain is felt at its maximum during the first 48 hours. He explains that this pain leads to the functional impotence. The physical examination has been most often poor, with oedema, deformity and pain not well localised. In the series of Nénopoulos [13], oedema and pain during the physical examination were found in all patients. The site of pain and deformity led to suspect a lesion of the tibia or the fibula. While among other patients, because of a big oedema the deformity has not been well appreciated, as well as the site of the fracture. In our study, most children presented with an ankle oedema which was diffuse in 90% of cases, making it difficult in localising the lesion. Toupin and Lechevalier [10] found out that the right side was the most involved, whereas our study shows an equality on both sides. Associated lesions are rare in the child because most of these fractures are due to sport and game related-accidents, which are not violent. But in our context they are frequent because of the impact violence. Another particularity in our study is the incidence of open fractures, mostly in type III Cauchoi.

This could be explained by the high frequency of road traffic accidents which lead to violent traumatism.

RADIOLOGICAL ASPECTS

In our study, the diagnosis of epiphyseal separation has been established with standard X-rays of the ankle in face and profile incidences. These incidences are not sufficient for many authors [8, 14, 15], which advise to add an oblique incidence. This allows not to forget about Tillaux's fracture and some other rare types. The oblique incidence has not been performed on our children, which can cause mistakes in the diagnosis, mostly for rare fractures.

X-rays show a predominance of the Salter and Harris type II of the tibia. These results agree with literature data. The second most frequent lesion is the Salter and Harris type I fracture of the tibia, but other series find the Salter and Harris type I fracture of the fibula [1,16]. According to these authors, the Salter and Harris type I fracture of the tibia is in only fourth position, after the Salter and Harris type III fracture of the tibia. The fracture type IV of the tibia is rare in our study (3.93%) as well as in Campbell's study (6%), whereas it reaches 12.5% in Melchior's series. The Salter and Harris type V is rare. It is not found in our series, as well as in Campbell's and Melchior's series [16, 17], and it represents only 1% in Spiegel's, Mizuta's and Peterson's series [1, 2, 7]. In the literature, epiphyseal separations of the fibula are mostly type II and I, whereas in our study it only was the type I. Types III and IV are known to be rare and they must not be confused with the ossification nucleus of the supernumerary bone of the fibula. Our series was also particular because we did not find any case of complex and rare fractures like triplane fractures or Tillaux's fractures. This could be due to an insufficient diagnosis because the oblique incidence was not required. Another particularity of our study was the high frequency of associated lesions, more often fractures. For example a fracture of the fibula shaft was frequent. The high incidence of associated lesions is due to the violence of the traumatism, occurring most often during a road accident.

CONCLUSION

Our study shows differences in comparison to other series. Epiphyseal separations of the ankle are due to traffic road accidents, whereas in the literature they are due to sport and game related-accidents. The cause of the traumatism explains the high frequency of a direct mechanism in our study, and the predominance of indirect mechanism in other

series. On a clinical level, there are many associated lesions, particularly open fractures.

X-rays show a similarity of the results for the type I of the tibia, whereas they are different from other types. We note many fractures as associated lesions; this is due to the violence of the traumatism. The absence of rare fractures could be explained by the insufficient diagnosis, because the oblique incidence is not required.

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