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Case Report / Olgu Sunumu

Case report: femoral and tibial fractures in child with myelomeningocele.

[Olgu sunumu: meningomyeloselli bir çocukta femoral ve tibial fraktürler]

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Abstract

Femoral and tibial fractures might occur from child abuse, accidents or pathological causes. It is very difficult to distinguish the real reason among those cases. Radiological diagnosis is needed for clinicians and medical examiners in order to find out the reason of fractures. In this report, we submit a case with femur and tibia fractures and with myelomeningocele. This patient was evaluated as a child abuse by clinicians. But we decided that her fractures were not because of child abuse. The values of her bone mineral density of the upper limb were low and her illness caused her fractures.

Keywords:

Femur fracture, tibia fracture, child abuse, myelomeningocele, bone mineral density.

Özet

Femoral ve tibial kırıklar, kazalar, çocuk istismarı ya da diğer patolojik nedenler ile meydana gelebilir. Bu kırıkların gerçek sebebi ayırabilmek sıklıkla çok zor bir durumdur. Radyolojik tanımlama, bu kırıkların sebebini bulmada klinisyenlerin ve adli bilirkişilerin en büyük yardımcısıdır. Bu makalede, biz femoral ve tibial kırıkları bulunan ve meningomyeloselin eşlik ettiği bir olguyu sunuyoruz. Bu hasta, klinisyenlerce bir çocuk istismarı olgusu olarak değerlendirilmişti. Gözden geçirdiğimizde, onun kırığının kaza dışı bir yaralanma olmadığına karar verildi. Alt ekstremitenin kemik mineral dansitesi değerleri düşüktü ve kırıkların sebebi hastalığı idi.

Anahtar Kelimeler:

Femur kırığı, tibia kırığı, çocuk istismarı, meningomyelosel, kemik mineral dansitesi.

1. Introduction

Non-accidental injuring of children entitles as “child abuse” and this is one of the major problems we face. Refractures, previous and present fractures are frequently seen. Fractures of the radius/ulna, tibia/fibula, or femur in children who are less than 2 years of age and especially in nonambulating infants are generally attributed to child abuse (1-6). The distal femur is a common indicator of child abuse but recent occurred diaphyseal fractures are more common (7-8). Therefore in all cases of suspected child abuse the distal femur region should evaluate carefully and detailed skeletal radiographs would be needed for this evaluation (7). In order to call these fractures as child abuse doctors must examine many factors such as accident, pathological causes, etc. for the result of criminality (1).

An accidental femur fractures in toddlers are generally caused by falling over, trips and fluffs and untoddlers’ femur fractures are not caused by those reasons. Those fractures are generally caused by either an organic pathologies or child abuse (5). Fracture of the femur does not occur if a baby or toddler falls off from a changing table or from an adult's arm (9). Attendant ignorance and/or carelessness are a common cause of those fractures for babies (5, 10). If there is a reasonable history for the cause of fracture, appropriate timing in seeking medical care, and no evidence of additional trauma; further evaluation will not be likely provide evidence of abuse. A skeletal survey and further

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evaluation should be conducted in a lack of even one of these criteria (2). Additionally, if it is reported that there is some changes in child's behavior and/or attitude, if attendants give different anamnesis and if an unreasonable claim is given for a severe injury, this situation must be considered as a child abuse (4).

In this study, we have presented a case of a child suffers from myelomeningocele, which was called by clinicians as "child abuse". Our aim is to define some procedures for appropriate approach for such cases.

2. Case

A 22-months old, white girl was born by a normal procedure and vaginal way in July 2001. Birth weight was 2800 grams. She had myelomeningocele. After the birth, she was hospitalized in the Hospital of Celal Bayar University for ten days because of aspiration of meconium. On the tenth day of birth, she was operated for the repairing of Myelomeningocele. Her motor growing was delayed due to the paraplegia. Rehabilitation programs were applied. She was not able to sit herself unsupported. After the 12th month, she was able to speak only a few words. Then she was hospitalized three times between June 2002 and January 2003 due to chronic constipation (caused by the narrowing of anal sphincter) and/or infection of urinary system.

She was brought to emergency services of hospital in May 2003. Her parents said that she had never suffered any trauma. When they had seen the swelling on her leg, they brought her to the hospital. In the medical examination in the emergency room, there was crepitation and 2-centimeters swelling on her right thigh comparing to other thigh, but no pathological action. There was no other traumatic finding in that or other regions of the body. Systemic examinations were normal. In the x-ray, non-displaced femur diaphysis fracture was diagnosed in the 1/3 midproximal of the femur (figure-1 and 2) then the fractured leg was plastered and constriction was applied in order to sustain the pelvis. Further to parents' anamnesis not mentioning anything clinicians informed the police for any case of child abuse. While the legal investigation continuing, she was once again brought to the hospital eight days after than the first constriction applied. There was swelling on her right calf but no ecchymosis or hyperemia. Her parents denied trauma again. In the x-ray, non-displaced proximal tibia fracture was diagnosed.

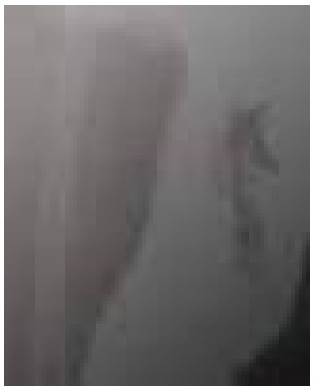

Figure 1. *Nondisplaced femur diaphyseal fracture in the child with myelomeningocele*

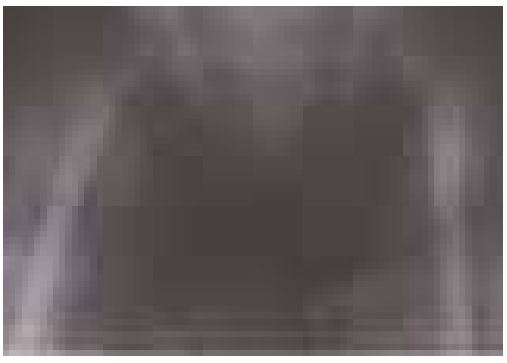

Figure 2. *Nondisplaced femur diaphyseal fracture in the child with myelomeningocele*

The patient and parents sent to our section (Department of Forensic Medicine, Medical Faculty of Celal Bayar University) by the court in June 2003 for the arrangement of medico-legal report whether there is a child abuse or not. She was brought us in her father's arm. She was not able to walk at all and she was not able to sit without a support either because her two legs were motionless and insensitive due to the myelomeningocele. She was making a great effort to sit and turn around by sustaining her hands. She was able to speak a few words, solely. Motor functions and physical growing were retarded. Because of insufficiency of her speaking, her

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parents expressed anamnesis. We talked to her father and mother separately. Our patient has two elder brothers and both are growing normally. We were told by her parents that they had noticed the swelling on the right leg of their daughter while she was lying in the bed. They took her to the hospital without any delay. She was treated and discharged from hospital. Eight days after the first treatment, they saw another swelling on her same leg again while she was lying on her bed. They found out about the second fracture when they brought her to hospital second time. According to them, their daughter was not exposed to any trauma and they did not understand why those fractures had been occurring.

In the medical examination, we saw that there was no swelling, and there was no present or past trauma finding except from scars of the initial medical operation. We diagnosed lacking of motion and insensitiveness on her both legs. Her genital organs were normal and there were no traumatic findings or it's sequels in her body. She had a proper hygiene and her health records were not existent any trauma related to her past except those fractures.

We wanted high- detailed skeletal radiographs in order to search any sequel were occurred before her first treatment in hospital for this case. Radiologists reported that they did not see any traumatic finding except the healed femoral and tibial fractures on her right leg, but they found osteopenia in her high-detailed skeletal radiographs.

Then we asked for bone mineral densitometry in order to define the numeric value of osteopenia. The Nuclear Medicine Laboratory reported total Bone Mineral Density (BMD) value 0,652 g/cm² by using GE Medical System LUNAR DPX NT. Other BMD values are shown in table-1. T Score and Z score were not defined because of lacking of the reference values in this age group.

Table 1. *BMD values of our case*

SEX: FEMALE	AGE: 2,8	HIGH: 82,0 cm	WEIGH: 9,0 kg
L1 BMD	0,184 g/cm²	**L3- L4 BMD**	0,219 g/cm²;
L2 BMD	0,225 g/cm²	**Cranium BMD**	0,822 g/cm²
L3 BMD	0,231 g/cm²	**Arms BMD**	0,424 g/cm²
L4 BMD	0,203 g/cm²	**Legs BMD**	0,439 g/cm²
L1- L2 BMD	0,206 g/cm²	**Body BMD**	0,440 g/cm²
L1- L3 BMD	0,215 g/cm²	**Costa BMD**	0,449 g/cm²
L1- L4 BMD	0,213 g/cm²	**Pelvis BMD**	0,397 g/cm²
L2- L3 BMD	0,228 g/cm²	**Spine BMD**	0,438 g/cm²
L2- L4 BMD	0,222 g/cm²	**TOTAL BMD**	**0,652 g/cm²**

We examined the literature to find the reference values. We found only one literature about total BMD values for the 0, 0 -0, 9 age group (11) and few literatures about children above 4 ages (12-14). But we couldn't find any information for the age of 2, 8.

Firstly, we correlated the values (minimum, medium and maximum values) which existed in the literature on a diagram. Then we statistically defined expected values for the age interval between 1 and 3.9 ages by using SPSS and excel programs and settled them to the diagram (figure 3). According to our diagram the result of total BMD from Nuclear Medicine laboratory was lower than its excepted minimal value. In this statistical evaluation, we used the BMD values in some related articles (11, 12, 15-17).

3. Discussion

Myelomeningocele is the second most common illness among children with neuromotor dysfunction and it is a complex syndrome that it especially involves nervous system, muscular-skeletal system and genitourinary system. However it has been reported that femur and tibia fractures caused by myelomeningocele (18-19). Additionally the existence of physical and mental defects and differences of appearance in those children generally have major risk factors for child abuse (20).

The anamnesis and behaviors of parents are very important but not unique to diagnose the child abuse and these are important indicators for judging (20). The attendants usually get delay to take the abused children to hospital. In such cases there are some contradictions between family members' statements and the anamnesis would not be enough to explain the physical findings.

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Additionally there would many contrasted trauma stories for only one injuring and/or many unreliable anamneses for recurrence of traumas. The parents usually accuse the sisters or brothers of the patients or they might accuse the children themselves. The victim of child abuse is taken to different hospitals (20, 21).

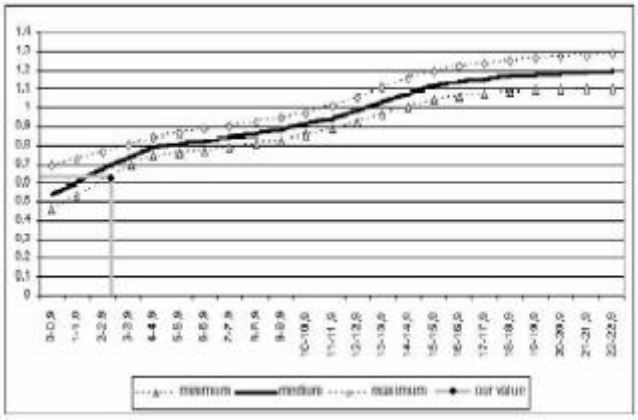

Figure 3. *Diagram of total BMD values that it was adapted according to Unal A., et al and van der Sluis IM., et al.*

(●: Present total BMD value in our case)

In our case the child was taken to hospital on time, there were no contradiction between father's and mother's statement, there were no accusing, the child has been taking to same hospital since her birth and she had no trauma in her health records apart from her those fractures.

In abused or neglected cases, hygiene is deteriorated and the multiple trauma findings, which occurred in different times, are defined clinical and/or radiological. Forensic examiners must investigate those findings (20, 22). Even if physical trauma finding was absent in the seeming, the x-rays of all body must obtained in all suspected child abuse cases for the investigation of fracture sequels in any bone (22).

We did the same. Although in our clinical investigation we didn't define any present or past trauma finding and we asked the high- detailed skeletal radiographs. In the report of the Radiology Section was stated that they did not see any traumatic changing except the healed femoral and tibial fractures on her right leg. They just determined the findings of osteopenia.

Bone mineral densitometry is the preferred method of diagnosis because osteoporosis must be severe before it can be detected by routine X-rays (23). If it considered that the bone mineral densitometry is unnecessary for the cases which have osteoporosis or osteopenia defined by x-rays, it will supply absolute and objective proofs for submitting to court. Additionally, the measurement of bone mineral density is a diagnosis method for distinguishing of intrinsic bone disease from child abuse in the investigation of the infant with unexplained fractures (23-26).

It is reported that the values of bone mineral density have decreased while the risk of pathologic bone fractures has increased among of the patients with myelomeningocele (23). The frequency and severity of such bone fractures in patients with myelomeningocele has been well documented by a number of orthopedists caring for these children (24). Quilis reported 55 fractures of the lower extremities in 15 of 130 children (27). Ouan and colleagues reported that Drennan and associates had found 58 fractures in 25 of 84 children; James had found 44 lower extremity fractures in 22 of 122 patients; and they found 19 lower extremity fractures in 8 of 35 patients in their self study (23). All authors felt that disuse of the limbs and overall physical inactivity contributed greatly to the increased risk of bone fractures (24, 27). Quan et al reported that bone mineral density of the distal radius in the patients with myelomeningocele was ~1 to 2 standard deviation units below the mean of the normal population and there were no significant differences between ambulators and nonambulators (24). Since our case's BMD values of tibia were not announced us by Nuclear Medicine laboratory, we couldn't any evaluation on this subject.

But we faced to the inadequacy of bone mineral density's reference values when we investigated literature. The reference values were described in only few manuscripts (11-17). We could pass over this problem owing to statistical methods using by the correlation of existent data in the literature (11, 12, 15-17). After the statistical correlation we saw that total BMD value of our case was lower than the expected minimal values.

We evaluated both the anamnesis about our patient and the findings of medical and radiological examination. Then we reported to court that fractures in the child's leg was not due to any trauma, they resulted from osteoporosis due to myelomeningocele and there were no any proofs of child abuse or neglect in the patient.

In conclusion, we suggest that the bone mineral densitometry supplies us numerical certain proofs which is helpful accepting or rejecting of initial diagnosis and

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to distinguish the origin of fractures in the patients with fractures accompanied by osteopenia and osteoporosis due to myelomeningocele. It will be useful in other patience which bone structure destructed as like osteogenesis imperfecta, Marfan syndrome, acute lymphoblastic leukemia also.

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