



Bilateral Distal Radius Epiphyseal Fracture in an Adolescent Weightlifter: Case report

Adolesan Halter Sporcusunda Bilateral Distal Radius Epifiz Fraktürü: Olgu Sunumu

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ABSTRACT

Sports-related epiphyseal fractures are extremely rare. Bilateral distal radius epiphyseal fractures of an male adolescent weightlifter have been presented. Following bilateral closed reduction and sportive rehabilitation he successfully returned to the sport. Adolescent athletes need supervision of an experienced trainer to avoid injuries when performing resistance exercises. Sufficient intake of micronutrients and vitamins such as Vitamin D which are influencing bone metabolism should be provided along with proper muscle strengthening program.

Key words: weightlifting, adolescent athlete, epiphyseal fracture, return to sport.

ÖZ

Spor ile ilişkili epifizial fraktür vakaları oldukça nadir gözlenmektedir. Adolesan erkek halter sporcusunda gelişen bilateral radius distal epifizial fraktürü sunulmuştur. Sporcuyu bilateral kapalı redüksiyon ile sportif rehabilitasyon sonunda başarıyla spora dönmüştür. Adolesan sporcuların direnç egzersizleri sırasında yaralanmalarını için deneyimli bir antrenörün gözetimine ihtiyaç duyulmaktadır. D vitamini gibi kemik metabolizmasını etkileyen mikrobeyin öğelerinin yeterli alımı uygun kuvvetlendirme programlarına eşlik etmelidir.

Anahtar sözcükler: halter, adolesan sporcu, epifiz fraktürü, spora dönüş

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INTRODUCTION

Until 1980s, resistance training such as weightlifting was not recommended for children and adolescents. This restriction had been attributed to the belief of high injury risks and possible irreversible sequelae of active growth plates (1,2). The physis, or growth plate is 3-5 times weaker than connective tissue, and this weakness is more evident under tension force and shear stress in particular (1). In contrast to these concerns, reports of sports-related epiphyseal fractures are extremely rare in literature (3,4). In studies which have examined the incidence of injuries on the basis of sports disciplines, it has been reported that

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weightlifting carries less risk of injury than other sports that involve jumping and landing (5).

There is not any scientific papers about the sportive rehabilitation outcomes of epiphyseal fractures related to the sports. The aim of this paper was to present the diagnosis, treatment, process of sportive rehabilitation and returning to sport of an adolescent athlete with bilateral distal radius epiphyseal fractures related to weightlifting.

CASE REPORT

A 16-year old male (height 160 cm, weight 71 kg, body mass index percentile: ≥85%) presented with complaints of pain and swelling on both of his wrists.

The patient reported that during clean and jerk training, the barbell with a weight of 98 kg slipped from his hands while attempting the ‘push and press’ technique 10 days ago. He noted that effusion developed in both wrists following that training session and could not attend training because of pain.

Physical examination revealed bilateral ecchymosis and effusion which was more evident in the left wrist volar region. The range of motion (ROM) of both wrists were restricted and painful in flexion, extension, ulnar and radial deviations. There was no disease or medication use in the patient history. On X-ray examinations, Salter Harris type 1 fracture was determined in the right distal radius and Salter Harris type 2 fracture in the left distal radius (Figure 1).

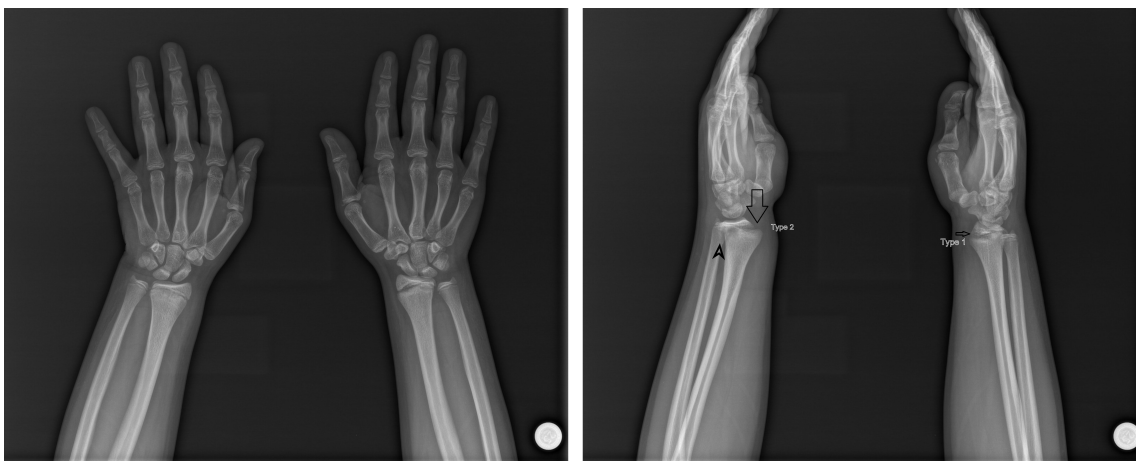


Figure 1: Bilateral radiographs of wrists (Salter Harris type 1 fracture in the right, and Salter Harris type 2 fracture in the left distal radius)

Biochemical analysis revealed normal 25-hydroxy Vitamin D; 13 ng/mL (N: 10-50 ng/mL), normal calcium; 10.1 mg/dL (N: 8.4-10.6 mg/dL), slightly high phosphorus; 5.1 mg/dL (N:2.7-4.5 mg/dL); high alkaline phosphatase; 190 U/L (N:40-130 U/L) and normal parathormone levels; 25.5 pg/mL (N:15-65 pg/mL).

Following bilateral closed reduction, the patient was followed with a short-arm splint for 3 weeks (Figure 2). 300,000 IU oral Vitamin D/day was prescribed and following 10 days of

Vitamin D supplementation, the 25-hydroxy Vitamin D blood level increased to 43.4 ng/ml.

After removal of the splints, bilateral limitations in wrist joints’ ROM (in flexion, extension, ulnar and radial deviation) were determined. Wrist joint flexor, extensor, supinator and pronator ROM exercises (3 sets x 15 reps) and wrist flexor, extensor, supinator and pronator muscle strengthening exercises (3 sets x 15 reps) at 40% of 1 repetition maximum (RM) were started.



Figure 2: Radiographs after bilateral closed reduction

ROM limitations of both wrists on each direction have been completely resolved after 15 days. Isokinetic testing (Isomed 2000, D&R Ferstl GmbH, Germany) was applied, (Table 1). Following the first isokinetic evaluation, wrist muscle strengthening exercises (3 sets x 15 reps) were given at 60% of 1 RM. The patient was permitted to resume technical training with a 15 kg barbell 15 days later, and 30 days later, snatch

technique with 67 kg, clean and jerk with 83 kg, and squat technique with 94 kg have been started.

Full bone recovery was determined without any sequelae (Figure 3) on the radiological images obtained 3 months after the development of the radius epiphyseal fractures. The athlete has been permitted to continue training at 80%-90% of 1 RM (3 sets x 15 reps).

Table 1: Isokinetic test data of wrist

		Right @ 60 °/s			Right @ 120 °/s			Left @ 60 °/s			Left @ 120 °/s		
		D ₀	M ₁	M ₆	D ₀	M ₁	M ₆	D ₀	M ₁	M ₆	D ₀	M ₁	M ₆
Flexor	TW (J)	39	58	66	120	167	206	15	27	59	49	78	186
	PT (Nm)	12	17	20	10	14	18	3	6	18	4	6	16
	PT/BW (Nm)	0.16	0.23	0.28	0.14	0.19	0.25	0.04	0.08	0.25	0.05	0.08	0.22
Extensor	TW (J)	22	31	36	66	93	111	21	29	33	42	59	98
	PT (Nm)	4	6	11	6	8	10	4	6	9	4	6	9
	PT/BW (Nm)	0.05	0.08	0.15	0.08	0.11	0.14	0.05	0.08	0.12	0.05	0.08	0.12

Isokinetic testing was applied to the wrist joint in concentric/concentric mode (60°/sec (5 repetitions) - 120°/sec (15 repetitions)). TW (J): Total Work (Joule), PT (Nm): Peak Tork (Newton meter), BW: body weight, s: second, D₀: First Day, M₁: Month 1, M₆: Month 6.



Figure 3: Follow-up radiographs at 3 months after the fractures

At the sixth month of follow-up, athlete reported full training participation without any complaints. The isokinetic muscle strength was found to be sufficient and return to sport at competitive level has been achieved. At the end of a 1-year follow-up, no re-injuries have been reported.

This case report has been presented after informed written consent of the patient and his parents have been received.

DISCUSSION

In Olympic weightlifting, the wrists and forearms are the areas of highest injury risk (6). But sports-related epiphyseal fractures are extremely rare (1,4).

Among all the patients aged 14-17 years admitted to Emergency Department, bilateral radial Salter Harris Type 2 epiphyseal fractures were determined in only 2 male weightlifters (7). The injury had occurred while attempting the military press (overhead press) technique with 34.1 kg (bodyweight: 45.4 kg) and with 81.8 kg (bodyweight: 93.2 kg) Both cases were treated with closed reduction and immobilisation, but the authors gave no information about sportive rehabilitation, follow-up and return to the sport processes (7).

Jenkins and Mintowt-Czyz reported the case of a 13-year old male weightlifter who lost his balance backwards while lifting a 30 kg bar over-

head. As a result of sudden hyperextension of the wrist, a Salter Harris Type 2 epiphyseal fracture developed (8). In this case, the fixation method was preferred after reduction, but again there were no data about sportive rehabilitation, follow-up or return to sport (8).

Gumbs et al. reported 2 cases of male weightlifters, aged 14-16 years, who developed bilateral radius and ulnar Salter Harris Type 2 fractures during an overhead press with 40-68 kg. Although the follow-up had not been stated, both cases were reported to have recovered without any complications (9).

In a report by Weiss and Sponseller, a 16-year old male weightlifter was diagnosed with a Salter Harris Type 1 distal radius fracture that occurred while performing a bench press with 48 kg in a supine position (10). Closed reduction was applied without difficulty in the treatment but no further sportive rehabilitation process and follow-up data were reported (10).

It is known that 15% of all paediatric fractures are seen in the physis region (11). However, there is no consensus on the method to be applied in the treatment of distal radius epiphyseal fractures. Most authors recommend non-surgical treatment methods because most forearm fractures heal without complications. In cases that develop complications, early physis arrest, re-displacement following closed reduction, malunion, acute carpal tunnel syndrome

and compartment syndrome are reported (11). In the current case, no complications developed following closed reduction and immobilisation. We could not compare other case reports' with present case due to the lack of information about sportive rehabilitation procedures in these reports.

It appears that normal calcium homeostasis is maintained in children and adolescents with plasma 25-hydroxy Vitamin D of over 50 nmol/L (>20 ng/mL). A low level of Vitamin D may lead to weakness of bone structure and forearm muscle strength (12). In the present case, the leading factors for this injury were considered to be training without the supervision of a qualified trainer, low level of Vitamin D, and a potential wrist muscle imbalance.

In conclusion, resistance exercises performed in the adolescent age group absolutely require necessary safety precautions, appropriate equipment, close monitoring of growth of the athlete, nutrition (Vitamin D etc), resting periods and habits (smoking, medications etc) under the supervision of a qualified trainer.

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