

Report of Ten Cases of Vascular and Orthopedic Injuries Following the Throwing Motion

Fırlatma Hareketi Sonrası Vasküler ve Ortopedik Yaralanma Gelişen On Olgunun Sunumu

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Geliş Tarihi/Received: 21.05.2012

Kabul Tarihi/Accepted: 04.06.2012

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ABSTRACT Vascular and orthopedic traumas due to throwing motion in the upper extremities are rarely seen in the emergency room, and they may end with serious complications if not early diagnosed and treated. Ten patients' records were evaluated retrospectively in terms of symptoms and treatment which were seen and treated due to vascular and orthopedic trauma in the upper extremity caused by throwing motion. All patients had pain and decreased rate of motion in the right upper extremity and a history of throwing an object. Four of them had severe cyanosis in the right hand. Capillary filling time was above 15 seconds, but distal pulses were palpable. Humerus fracture was detected in two patients by radiological evaluation. Four patients with cyanosis in the right hand were admitted to the Department of Cardiovascular Surgery. Remaining four cases were discharged after medical treatment with the diagnosis of soft tissue trauma. Early intervention will decrease the risk of complication in these traumas, thus they should not be underestimated.

Key Words: Upper extremity; cyanosis; arm injuries; humeral fractures

ÖZET Fırlatma hareketine bağlı üst ekstremitelerde gelişen vasküler ve ortopedik travmalar acil serviste nadir görülen fakat erken teşhis ve tedavi edilmezse komplikasyonlarla seyreden travmalardır. Fırlatma hareketine bağlı üst ekstremitelerde vasküler ve ortopedik travma gelişerek tedavi edilen 10 hastaya ait kayıtlar, hastaların semptomları ve tedavi yönünden retrospektif olarak değerlendirildi. Bütün olgular ağır cisim fırlattıkları sağ ellerinde ağrı ve hareket kısıtlılığı şikayeti ile başvurmuştu. Bunlardan 4 hastada sağ ellerinde ileri derecede siyanoz mevcuttu. Kapiller doluş zamanı 15 sn üzerindeydi. Ancak distal nabızlar palpabl idi. Yapılan radyolojik incelemede 2 hastada humerus fraktürü tespit edildi. Sağ elde siyanoz gelişen 4 olgu Kalp Damar Cerrahisi Servisine yatırılarak tedaviye başlandı. Diğer 4 olgu ise yumuşak doku travması tanısı ile medikal tedavileri düzenlenerek taburcu edildi. Bu travmalarda erken müdahale komplikasyon riskini önemli ölçüde azaltacağından dolayı hafife almamak gerekmektedir.

Anahtar Kelimeler: Üst ekstremiteler; siyanoz; kol yaralanmaları; humerus kırıkları

Damar Cer Derg 2012;21(2):158-60

The throwing motion is an extremely skilled movement performed at high velocity, which requires muscular strength, coordination, and neuromuscular control. The throwing motion generates extraordinary demands on the arm.¹

Most of upper extremity injuries occurring in throwing sports include the soft tissue structures. Humeral fractures due to intensive muscular forces occurring while throwing a stone, snowball, javelin, hand grenade, baseball, or softball are rare but described mechanisms in the literature.^{2,3}

The sports medicine literature is filled with definitions of musculoskeletal injuries in the athlete, but uncommonly are arterial or venous abnormalities addressed. Failure to diagnosis a vascular injury in throwing injury may result in the insufficiency to treat a potentially limb-threatening lesion. Accurate diagnosis requires a high level of suspicion, a detailed vascular history and physical examination of the patient.⁴

In this article we present ten cases with orthopedic and vascular injuries related to the throwing motion with the current literature.

MATERIAL AND METHODS

Ten patients' records were evaluated retrospectively in terms of symptoms and treatment which were seen and treated due to vascular and orthopedic trauma in the upper extremity caused by throwing motion at Erzurum Maresal Cakmak Military Hospital between January and April 2007. Mean arrival time to the hospital after the incident and mean duration of capillary filling time normalization after treatment of four patients that have vascular circulatory disorder were determined. Because of insufficient patient number, no statistics and comparison were made.

RESULTS

All patients had pain and decreased rate of motion in the right upper extremity and a history of throwing a training grenade using the right hand. The distribution of age was 20-24 with a mean age of 21.5 ± 0.7 and all of the patients were male (100%). Humerus fracture was detected in two patients by radiological evaluation and one of them was comminuted fracture, therefore they were admitted to Department of Orthopedics for surgery. Four of them had severe cyanosis in the right hand and capillary filling time was above 15 seconds, but distal pulses were palpable (Figure 1). Color Doppler ultrasound examination of the upper extremity venous and arterial vascular structures was found to be normal. Additionally, it was learned that none of them had a prior vasospastic disease. They were admitted to Department of Cardiovascular Surgery

with prediagnosis of peripheral circulatory disorders and initiated low molecular weight heparin, dextran 40 (40 cc/hour) and pentoxifylline (120 mg/hour) infusion treatment. Remaining four cases were discharged after medical treatment with the diagnosis of muscular strain. Mean arrival time to the hospital after the incident of four patients that have vascular circulatory disorder was 12.5 ± 10.03 hours and mean duration of capillary filling time normalization after treatment was detected as 89.25 ± 60.27 hours (Figure 2). All patients were successfully treated. It was seen that, as the arrival time to the hospital increases, duration of capillary filling time normalization increases too.

DISCUSSION

The throwing motion is a very complex function, combining both translational and rotational movements. In the course of throwing motion, the arm is stressed to its biomechanical limits. Hard and soft joint tissues are loaded to capacity to produce and control rapid motions.⁵ The nature of the injury is modified by many things, including physical maturity of the patient, weight and type of object to be propelled, presence of weakness or fatigue and incoordination of the motion.⁶ In our cases, we



FIGURE 1: It was shown a cyanotic hand (right) and prolonged capillary refill time (left).

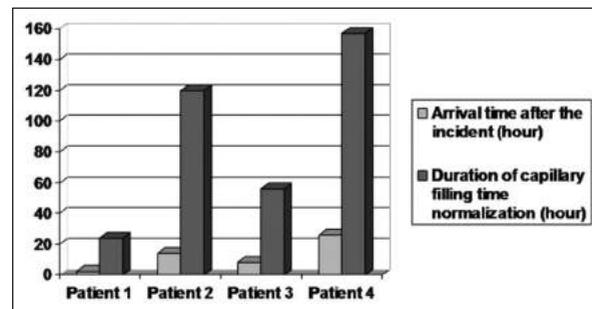


FIGURE 2: Distribution of arrival times and duration of capillary filling time normalization according to the patients.

thought that one or more of the factors listed above may have been effective.

Thrower's fractures are more common in amateur throwers because of unsynchronized muscular activity and uncoordinated throwing styles. It is easier to diagnose orthopedic traumas using direct x-rays.⁷ Torsional forces or torque occurred around the long axis of the arm in the final phase of throwing typically give rise to spiral fractures in the middle to distal humerus. Humeral torque is comparative to the mass of the object being thrown.⁸ In our cases, the training grenade (565 gr) was also relatively heavy and we think that the high humeral torque, unsynchronized muscular activity and throwing style plays a significant role in humerus fractures.

Vascular and nerve injuries are common in upper extremity and they can be overlooked. Diagnosing vascular traumas is relatively more difficult. A vascular lesion should be suspected in any thrower complaining of fatigue, pain or swelling in an extremity.⁹ It can be quite difficult to diagnosis via doppler ultrasonography. That is because although the distal pulses are palpable, circulation in the capillary level is significantly disturbed. This may lead to serious consequences such as loss of distal phalanx if the treatment is not initiated as soon as possible.¹⁰

The treatment of the capillary injuries occurring in throwing motion is simple and effective.

Early treatment provides dramatical improvement and excellent results. Improvement in capillary circulation delays with medical treatment in late cases. Failure to recognize a vascular injury in these patients may result in the failure to treat a potentially limb-threatening lesion.¹¹ In the treatment of our cases we used pentoxifylin with its antithrombotic and antithrombotic effects that improves the perfusion of the microcirculation. Pentoxifylline has regulator effects on the blood flow and it improves microvascular blood flow in conditions of vascular insufficiency.¹² A few studies suggest pentoxifylline may also be a vasodilator.^{13,14} Sonkin et al showed that pentoxifylline can significantly dilate small arteries precontracted with norepinephrine. Their results suggest that vasodilatation may play a role in the ability of pentoxifylline to improve arterial blood flow.¹⁵

CONCLUSION

Such traumas especially caused by throwing motion are very rare and microtraumatic injuries may be prevented by emphasizing safe parameters of participation, proper throwing techniques, and careful monitoring of the amount of practice time and intensity. Early intervention will decrease the risk of complication in these traumas, thus they should not be underestimated.

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