

ORIGINAL ARTICLE

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Distal radius torus fractures overlooked in emergency department: What happens?**✉ Mehmet Cenk Turgut¹, ✉ Serdar Toy², ✉ Sultan Tuna Akgol Gur³, ✉ Abdullah Osman Kocak³, ✉ Ahmet Kose¹**¹Health Sciences University, Erzurum Regional Training and Research Hospital, Department of Orthopedics and Traumatology, Erzurum, Turkey²Agri Training and Research Hospital, Department of Orthopedics and Traumatology, Agri, Turkey³Ataturk University, Faculty of Medicine, Department of Emergency Medicine, Erzurum, Turkey

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**Abstract**

A third of all fractures in childhood occur at the wrist level due to falling on an open hand. Torus fractures without separation in the cortex in which integrity is not disturbed result from thick periosteum and bone elasticity in children. Several studies have shown that in torus fractures, plaster immobilization and long-term follow-up are not necessary. This study aims to draw attention to unnecessary long-term immobilization, labor loss, and radiation exposure in distal radius torus fractures. It was found that patients admitted to the emergency room, between January 2019 and April 2020, with upper extremity trauma had torus fractures overlooked by retrospective x-ray examinations. Age, gender, the affected side, pain, function, and complications of patients with distal radius torus fractures were recorded by phone or face-to-face interviews. Of the 111 patients in the study, 20 (18.0%) stated that they re-admitted to the hospital due to pain and 6 (5.4%) due to joint mobility limitations. It was observed that all of the patients who were re-admitted to the hospital were evaluated by repetition of x-ray examinations, and a long arm splint was applied to all of them. It was understood that none of the remaining 85 patients were admitted to the hospital again for this reason, and none of them completed this healing process without using plaster-splint without limiting their functionality. None of the patients had pain and loss of function big enough to affect their daily activities. None of the 111 patients who were able to come for re-examination had joint movement loss, elastic deformation, and cosmetic defects. No patient was asked to have an x-ray again because it would be unnecessary. Long-term immobilization, circular plaster application, and serial x-ray controls constitute unnecessary loss of labor and patient exposure in distal radius torus fractures. Treatment of distal radius torus fractures that do not have a heavy load exposure, such as lower extremity, should be done with elastic bandages with short-term follow-up and by addressing the concerns of the patient's family.

Keywords: Bandage, cast, splint, torus**Introduction**

Distal radius torus fractures in childhood are the most common type of fracture in emergency and orthopedic clinics. 27.2% of pediatric fractures are wrist torus fractures. 50% of pediatric wrist fractures consist of these fractures. They are more common, especially between the ages of 7 and 12 [1, 2]. Children's bones are structurally more elastic than adult's bones. Due to this elasticity, the deformation that occurs without separation in the single cortex after trauma is called a torus fracture. It should not be confused with the 'greenstick fracture' with damage in the cortex. Torus fractures are defined as compression failure of the bone and occur in the transitional region of the bone between metaphysis and diaphysis. They are often seen in the distal radius [3-5].

These fractures that occur in the bones that have not completed their skeletal maturation heal very quickly and without risk. There are significant differences in the treatment of torus fractures in the literature and practice. In the treatment, many methods are used, from forearm plaster to Futuro™ type removable wrist arm splint. In current books, it is stated that immobilization and weekly x-ray checks are appropriate for 3-4 weeks in a standard forearm plaster [5]. Today we frequently see that different physicians and hospitals have different follow-up times and methods. These fractures, which were followed by fixed forearm plaster and splint in the past, are now being observed with removable fixed splints, and the studies supporting this in the literature are increasing day by day [6, 7].

Materials and Methods**Study design and setting**

Our study has a retrospective design. It was conducted in the Ataturk University Faculty of Medicine emergency department,

*Corresponding Author: Serdar Toy, Agri Training and Research Hospital, Department of Orthopedics and Traumatology, Agri, Turkey
E-mail: serdartyoy737@gmail.com

which receives approximately 120,000 admissions annually. In our region, it currently serves as the trauma center. Patients with upper extremity trauma between the ages of 4 and 12 were included in the study. Ethics committee approval has been obtained from the local ethics committee (Approval number:57, date: 05.11.2020). The study was carried out in accordance with the principles of the Helsinki Declaration.

Patients

Patient selection was made as follows: Patients between the ages of 4 and 12 admitted to the emergency department between 1 January 2019 and 30 April 2020, with upper extremity trauma who underwent upper extremity imaging (n=2340) were identified and examined through the automation system of our hospital. An orthopedic specialist examined radiological images of all patients included in the study. One hundred seventy-eight patients whose anamneses could not be taken or who had incomplete information in the anamneses were excluded from the study. The anamneses of the remaining patients were evaluated separately. 1981 patients who received the correct diagnosis after radiological examination were excluded from the study. A total of 181 patients were found to have overlooked torus fractures. Of the 181 patients, 30 could not be reached. These 151 patients were invited to the hospital for a face-to-face check-up examination, but 40 patients refused to come to the hospital for a check-up examination. Our study was completed with 111 patients. Our study's primary endpoint was determined as the presence of a torus fracture in the upper extremity x-ray.

Measurements

The information of the selected patient group was obtained using the automation system of the hospital. The medical characteristics of the patients (such as age, gender) were taken from the hospital automation system. Other information (affected side, complication, bone with torus fracture) was obtained by calling the patients for a

control examination.

Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS, v 25.0, IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) at a significance level of 0.05. The descriptive data were analyzed using numbers (n) and percentages (%).

Results

Of the 111 patients included in the study, 39 were girls (35.1%), and 72 were boys (64.9%). Demographic data and affected parties are given in Table 1. The mean age of the patients was 7.23 ± 2.55 (range:4-12) years. Thirty-nine patients were (35.1%) girls, and 72 patients (64.9%) were boys. In 69 (62.2%) of the patients in the study, the right side was affected; 36 (32.4%) patients were also involved on the left side; 6 (5.4%) patients were bilaterally affected. Seventy-four patients (66.7%) had radius fractures; 23 (20.7%) patients had ulna fractures; 14 (12.6%) patients had both radius and ulna fractures.

Of the 111 patients in the study, 20 (18.0%) were reported to have admitted to the hospital within the first 2 days due to pain and sensitivity, and 6 (5.4%) due to joint mobility limitations. It was observed that all the patients who were re-admitted to the hospital were evaluated by requesting the repetition of x-ray examination, and all of them had long-arm splint applied. It was understood that none of the remaining 85 patients were admitted to the hospital again for this reason, and none of them completed this healing process without using plaster-splint without limiting their functionality. None of the patients had pain and loss of function large enough to affect their daily activities. None of the 111 patients who were able to come for re-examination had joint movement loss, elastic deformation, and cosmetic defects. No patient was asked for an x-ray again because it would be unnecessary.

Table 1. Characteristics of all patients with detected torus fractures

		n	%
Gender	Female	39	35.1
	Male	72	64.9
Side	Right	69	62.2
	Left	36	32.4
	Bilateral	6	5.4
Fractured Bone	Radius	74	66.7
	Ulna	23	20.7
	Radius and Ulna	14	12.6
Complication	None	85	76.6
	Pain	20	18.0
	limitation of movement	6	5.4

Discussion

Proponents of constant plaster-splint immobilization practices in treating torus fractures claim that this method relieves pain and prevents complications such as the separation of fractures.

However, there is evidence in the literature that supports that rigid immobilization has little effect on pain control, that there is no risk of fracture separation, that the patient will unnecessarily restrict his function, and that there will be no complications in these fractures. Contrary to the past, many physicians now consider

that these fractures can be safely discharged with the diagnosis of these fractures without any functional restrictions or discharged at home with splints that the patient can remove [8-12]. Our study determined that the overlooked torus fractures healed without complications, even without the splint. In our research, the option of following patients with splints instead of circular plaster is adopted as a more appropriate treatment.

Torus fractures are considered to be inherently stable fractures and have an excellent prognosis. Unlike greenstick fractures, the periosteum around the cortex is intact in these fractures, so they heal entirely in a short time without displacement. In addition, it has a great healing capacity in the metaphysis bone [10, 13]. Treatments for torus fractures are based on pain control and the relief of the family. Torus fractures, which are classically followed by plaster-splint and weekly x-ray checks, actually constitute a severe loss of time and workload for physicians and families.

When we examine the literature, soft detection methods were found to be more advantageous in terms of cost, comfort, and patient preference in a study comparing rigid immobilization (plaster-splint) with softer detection methods (elastic bandage, breys) in torus fractures [14]. In another study comparing rigid immobilization with gentle immobilization on 42 patients with torus fractures, soft immobilization was more advantageous [15]. Unlike lower extremity torus fractures, these injuries to the wrist are not subjected to a heavy load and will heal without disrupting functionality without needing plaster-splint detection. As our study shows, wrist torus fractures can heal without severe pain deformation without resulting in any injuries, even if they are missed. Therefore, we recommend using soft removable stabilizing materials in these patients.

In addition, a direct x-ray is taken in the follow-up of torus fractures [5]. With our study, it has been shown that torus fractures that are not checked regularly also heal without complications. Calling patients for a weekly check-up and having an x-ray done will lead to unnecessary radiation exposure for these patients. In addition, since both families and themselves frequently enter the hospital environment, the rates of infectious diseases may increase.

Torus fractures can sometimes lead to plastic deformation that needs to be corrected, which can also be seen from the outside. However, the diagnosis of these patients will not be overlooked by physicians and families as they already have an externally visible deformation. This was not the case with any patient that we included in our study who had overlooked fractures.

We did not observe any complications in overlooked torus fractures, in fact, it is seen that the complication in these fractures is not due to fracture but to treatment. Compartment syndrome and joint stiffness can be seen as a result of unnecessary circular plaster applications for these fractures. Some physicians argue that they perform splint applications for pain control, but even in these applications, when the immobilization period is slightly longer, it results in joint stiffness, which creates an unnecessary loss of time for patients and physicians even if this problem can be solved. Due to extremities that are defunctionalized by 3-4 weeks of splint applications, it also prevents the education and hygiene of these children of play age.

As a result, we think that elastic splint or bandage application instead of circular plaster in torus fractures has similar effects on healing, and the elastic splint or bandage applications are more effective in terms of patient comfort and workforce loss.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Ethics committee approval has been obtained from the local ethics committee (Approval number:57, date: 05.11.2020).

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