

Hand Injuries Caused by Glass Punching in Children and Adolescents: Clinical Characteristics and Injured Structures

Çocuklarda ve Ergenlerde Cam Yumruklama Sonucu Meydana Gelen El Yaralanmaları: Klinik Özellikler ve Yaralanan Yapılar

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ABSTRACT

Objective: Glass punching is a dangerous act performed in a moment of frustration or anger that can lead to serious intentional self-inflicted hand injuries, deep cuts, and nerve and tendon damage. Although mostly described in adults, it is less well characterized in children and adolescents, in whom the consequences for the developing hand may be considerably deleterious. In this article we have aimed to describe the demographic and clinical characteristics, injured structures, and management of pediatric patients undergoing surgery for glass-punching injuries.

Method: We have retrospectively reviewed patients younger than 18 years who underwent surgery to manage hand injuries caused by punching glass at the hand surgery and plastic surgery clinics of a tertiary center between 2021 and 2025. Demographic data, the laterality of injury, the type of anesthesia employed, and all injured structures were recorded and analyzed individually and in anatomical groups.

Results: Twenty-seven patients were included in the analyses. The mean age of the patients was 14.2±2.9 years (range, 6-17 years), and 22 (81.5%) of them were boys. The right hand was injured in 76.9% of the cases. A tendon injury was present in 24 (88.9%) patients; while flexor tendons were affected in 19 (70.4%) and extensors in 10 (37.0%) patients. The flexor carpi radialis was the most frequently injured single tendon (40.7%). A major nerve injury occurred in 8 (29.6%) and an arterial injury in 9 (33.3%) cases, 16 (59.3%) patients had a nerve and/or vascular injury.

Conclusion: Glass punching in children and adolescents is a mostly male- dominant-hand injury that frequently damages deep structures of the affected hand. Because these injuries are largely preventable, early recognition, careful exploration, and attention to the psychosocial context are essential.

Keywords: Children, adolescents, glass-punching, hand and tendon injuries

ÖZ

Amaç: Cam yumruklama, genellikle öfke anında ortaya çıkan, kasıtlı ve kişinin kendisini zorladığı bir el yaralanması mekanizması olarak kabul edilmektedir. Yetişkinlerde tanımlanmış olmasına rağmen, çocuklar ve ergenlerde bu durum daha az ayrıntılı olarak tanımlanmıştır; oysa bu yaş gruplarında gelişmekte olan el için sonuçları önemli olabilir. Çalışmamızda, cam yumruklama yaralanmaları nedeniyle ameliyat geçiren pediatrik hastaların demografik ve klinik özelliklerini, yaralanan yapıları ve tedavisini tanımlamayı amaçladık.

Yöntem: 2021 ile 2025 yılları arasında bir üçüncü basamak merkezin el cerrahisi ve plastik cerrahi kliniklerinde cama öfke ile vurma sonucu oluşan el yaralanmaları nedeniyle ameliyat geçiren 18 yaşından küçük hastaları retrospektif olarak inceledik. Demografik veriler, yaralanmanın olduğu taraf, anestezi türü ve tüm yaralanan yapılar kaydedildi ve hem bireysel olarak hem de anatomik gruplar halinde analiz edildi.

Bulgular: Çalışmaya 27 hasta dahil edildi. Ortalama yaş 14,2±2,9 idi (aralık, 6-17) ve 22'si (%81,5) erkekti. Yaralanan ellerin %76,9'unda sağ el yaralanmıştı. Yirmi dört (%88,9) hastada tendon yaralanması mevcuttu; 19'unda (%70,4) fleksör tendonlar, 10'unda (%37,0) ise ekstansör tendonlar etkilenmişti. En sık yaralanan

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tek tendon, fleksör carpi radialis idi (%40,7). Sekiz (%29,6) hastada majör sinir yaralanması, 9 (%33,3) hastada arter yaralanması, toplamda 16 (%59,3) hastada sinir ve/veya damar yaralanması görüldü.

Sonuç: Çocuklarda ve ergenlerde cama yumruk atarak yaralanma, ağırlıklı olarak erkeklerde ve dominant elde görülen, sık sık derin yapıları tahrip eden bir yaralanmadır. Bu yaralanmalar büyük ölçüde önlenebilir olduğundan, erken teşhis, dikkatli muayene ve psikososyal bağlama özen gösterilmesi hayati önem taşımaktadır.

Anahtar kelimeler: Çocuk, adolesan, cam yumruklama, el ve tendon yaralanmaları

INTRODUCTION

Hand injuries are common in children and represent an important cause of functional impairment⁽¹⁾. Because the hand is essential for play, learning, and self-care, even minor traumas can have lasting effects on daily activities⁽²⁾. Although these injuries are rarely life-threatening, recovery may be prolonged and can lead to permanent disability⁽³⁾.

Among pediatric hand injuries, glass-punching trauma is a significant concern. Such injuries often involve deep lacerations involving tendons, nerves, or vessels, requiring surgical repair and prolonged rehabilitation⁽⁴⁾. While most cases are accidental, a small subset of them result from intentional, self-inflicted actions. One characteristic injury is glass-punching trauma, in which the child strikes a glass surface in anger or frustration, causing severe soft-tissue and skeletal injury⁽⁵⁾. In contrast to accidental glass injuries, punching glass tends to affect the volar surfaces of wrist and distal forearm, where superficially located tendons, nerves, and vessels are particularly vulnerable, and has therefore been associated with so-called "spaghetti wrist" injuries⁽⁶⁾.

Intentional glass punching injuries in children raise important clinical and psychosocial issues. Beyond the physical damage, they may reflect emotional distress and create additional burden for families⁽⁷⁾. Functional loss during developmental years can interfere with the acquisition of fine motor skills, independence, and social participation, potentially leading to lifelong disability⁽⁸⁾. In adults, the typical patient who punches glass is a young, single male, frequently intoxicated, and the dominant hand is most often injured⁽⁹⁾; the extent of these patterns in children and adolescents is less well defined. This study aims to describe the clinical features, injured structures, and management of pediatric hand injuries caused by glass punching and to raise awareness of their functional and psychosocial implications.

MATERIALS and METHODS

This single-center, retrospective study was conducted at a tertiary care hospital. We reviewed the records of patients younger than 18 years who presented to the

hand surgery and plastic and reconstructive surgery clinics between 2021 and 2025, and underwent surgery for an acute hand injury caused by punching glass. Patients were identified from the operative registries of both clinics using the documented mechanism of injury (punched glass/hit glass). A hand injury was defined as damage to the structures of the upper limb at or distal to the distal forearm and wrist.

Patients younger than 18 years who received surgical treatment for injury resulting from intentionally punching glass were included in the study. Patients aged (≥ 18 yrs) whose hand injuries were not caused by punching glass (for example, accidental glass laceration, a sharp-object or knife injury, or injury sustained while punching a non-glass object); conservatively treated cases; patients with missing essential details of the injurious incidents were excluded from the study.

Charts, operative notes, and emergency department records were reviewed to collect demographic data (age and sex), information concerning the injured and operated side, the date and time of presentation, the type of anesthesia, and all injured anatomical structures were recorded at the time of surgical exploration. Recorded anatomical structures included the flexor tendons (palmaris longus, flexor carpi radialis, flexor carpi ulnaris, flexor pollicis longus, and the flexor digitorum superficialis and profundus of each finger), the extensor tendons (extensor pollicis longus, extensor digitorum communis, extensor indicis proprius, extensor digiti minimi, brachioradialis, sagittal band, and central slip), the major nerves (median and ulnar), radial sensory and digital nerves, radial and ulnar arteries and forearm veins. Injuries were analysed both as involved individual structures, and grouped by anatomical categories.

The study was conducted following approval granted from the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital Ethics Committee of Scientific Research (decision no: 2026-191, date: 29.04.2026) and in accordance with the World Medical Association Declaration of Helsinki Medical Research Involving Human Participants. This is a retrospective study. The study was approved by the institutional ethics

committee and conducted in accordance with the World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects.

Statistical Analysis

This is a descriptive case series; no comparative or inferential statistical tests were performed. Continuous variables (age) are expressed as mean $\pm$ standard deviation with the median and range, and categorical variables as frequency and percentage. Demographic variables were calculated once per patient ($n=27$). Laterality, however, was calculated per injured hand ($n=26$, since one patient had bilateral injuries), and injured anatomical structures were combined across both hands at the patient level. All analyses were performed using GraphPad Prism (GraphPad Software, Boston, MA, USA).

RESULTS

Twenty-seven patients met the inclusion criteria including patients treated by the hand surgery ($n=14$) and by the plastic and reconstructive surgery clinics ($n=13$). The mean age of the patients was 14.2 ± 2.9 years (median, 15; range, 6-17 years). Boys predominated, accounting for 22 (81.5%) and girls for 5 (18.5%) patients with a male-to-female ratio of approximately 4.4 to 1. The right hand was injured in the great majority of cases (20/26 injured hands, 76.9%), while the left hand was affected in 6 (23.1%) cases. One patient had sustained bilateral injuries. The demographic and clinical characteristics of the patients are summarized in Table 1.

Surgery was performed under general anesthesia in 13 (48.1%), peripheral nerve block in 10 (37.0%), and local anesthesia in 4 (14.8%) patients.

Tendon injury was the most common finding observed in 24 (88.9%) patients. Flexor tendons were affected in 19 (70.4%) and extensor tendons in 10 (37.0%) patients. The tendon of flexor carpi radialis was the most frequently injured ($n=11$; 40.7%) tendon followed by the tendons of palmaris longus and flexor pollicis longus (7 patients each, 25.9%) and the extensor digitorum communis ($n=6$; 22.2%). The flexor digitorum superficialis was injured far more often than the flexor digitorum profundus, consistent with the more superficial volar position of the former at the level of the distal forearm and wrist. The frequencies of individually injured anatomical structures are presented in Table 2.

Neurovascular injuries were frequent. A major nerve injury (median or ulnar) was identified in 8 (29.6%); median, and ulnar nerve injuries were observed in 7

Table 1. Demographic and clinical characteristics of the patients ($n=27$)

Characteristics	n
Age, years—mean $\pm$ SD (range)	14.2 $\pm$ 2.9 (6-17)
Age, years—median	15
Sex—male, n (%)	22 (81.5)
Sex—female, n (%)	5 (18.5)
Injured side—right, n (%)*	20 (76.9)
Injured side—left, n (%)*	6 (23.1)
Anesthesia—general, n (%)	13 (48.1)
Anesthesia—regional block, n (%)	10 (37.0)
Anesthesia—local, n (%)	4 (14.8)
Tendon injury, n (%)	24 (88.9)
Flexor tendon injury, n (%)	19 (70.4)
Extensor tendon injury, n (%)	10 (37.0)
Major nerve (median or ulnar) injury, n (%)	8 (29.6)
Arterial injury, n (%)	9 (33.3)
Venous injury, n (%)	2 (7.4)
Nerve and/or vascular injury, n (%)	16 (59.3)
Combined tendon, nerve, and artery injury, n (%)	3 (11.1)

*: Calculated across 26 injured hands; one patient had bilateral injuries, SD: Standard deviation

Table 2. Frequency of individually injured anatomical structures ($n=27$)

Anatomical structures	Category	n (%)
Flexor carpi radialis	Flexor tendon	11 (40.7)
Palmaris longus	Flexor tendon	7 (25.9)
Flexor pollicis longus	Flexor tendon	7 (25.9)
Flexor carpi ulnaris	Flexor tendon	4 (14.8)
Flexor digitorum superficialis (any)	Flexor tendon	7 (25.9)
Flexor digitorum profundus (any)	Flexor tendon	1 (3.7)
Extensor digitorum communis	Extensor tendon	6 (22.2)
Extensor digiti minimi	Extensor tendon	3 (11.1)
Extensor pollicis longus	Extensor tendon	2 (7.4)
Extensor indicis proprius	Extensor tendon	2 (7.4)
Median nerve	Major nerve	7 (25.9)
Ulnar nerve	Major nerve	2 (7.4)
Radial sensory nerve	Sensory nerve	2 (7.4)
Radial artery	Artery	6 (22.2)
Ulnar artery	Artery	3 (11.1)
Forearm veins	Vein	2 (7.4)

Percentages are calculated at the patient level; many patients had sustained injuries affecting more than one anatomical structure

(25.9%) and 2 (7.4%) patients respectively. Radial arteries were injured in 6 (22.2%), ulnar artery in 3 (11.1%) patients, while venous injuries were noted in 2 (7.4%) patients. A combined tendon, nerve, and artery (spaghetti-type) injury was present in 3 (11.1%) patients. Overall, 16 (59.3%) patients sustained an injury to at least one nerve and/or vessel, underscoring the depth and severity of damage that these apparently localized wounds can conceal.

DISCUSSION

This study describes a consecutive series of children and adolescents who underwent surgery for the management of hand injuries caused by punching glass. The principal findings—a strong male predominance, mean age in the mid-teens, frequent involvement of the dominant right hand, and a high rate of deep tendon, nerve, and vessel injury—are consistent with the established profile of glass-punching injuries while extending it to a pediatric population.

The demographic pattern in our cohort closely mirrors that reported in adults. In the largest English-language series of glass-punching injuries, Schaefer et al.⁽⁹⁾ described a typical patient who was a young, single, often intoxicated man, with his dominant hand most commonly injured. Turkish series have reported similar profiles, with male predominance and a clear preponderance of right-sided, dominant-hand injuries^(10,11). Our findings signifying that more than 80% of patients were boys and that more than three-quarters of injured hands were the dominant right hands are in keeping with these observations. The mechanism itself explains this lateralization: Punching glass is usually performed with the dominant hand, and as the fist is withdrawn, the volar surfaces of wrist and distal forearm are drawn back across the retained jagged edges of broken annealed glass, exposing the superficial flexor tendons, nerves, and vessels to injury⁽¹⁰⁾.

The relatively higher incidence of deep-structure injury in our series is clinically important. Tendon injuries were present in almost nine of ten patients, and flexor tendons were involved twice as often as extensor tendons. Since the flexor carpi radialis is stretched and brought close to the skin surface during the punching motion, it was the most frequently injured tendon per se, a pattern also highlighted in adults, in whom the flexor carpi radialis is thought to be especially vulnerable to trauma⁽¹²⁾. The predominance of flexor digitorum superficialis injuries over flexor digitorum profundus injuries reflects the more superficial volar position of the superficialis muscle at the wrist. Neurovascular injuries were also common: A major nerve, and an artery were injured in almost a third

of patients, and overall nearly six in ten patients had a nerve and/or vascular injury. These figures emphasize that wounds which may appear deceptively small can conceal extensive damage to deep structures^(6,12). Several authors have shown that clinical examination alone underestimates the extent of glass-punching injuries and that a low threshold for formal surgical exploration is warranted⁽⁹⁾.

A combined tendon, nerve, and artery injury was present in approximately one in nine patients in our series. Such concentrated volar wrist injuries, frequently described as “spaghetti wrist”, carry a substantial risk of long-term functional impairment and demand meticulous microsurgical repair and structured rehabilitation⁽⁶⁾. In children, the consequences may be magnified: Pediatric patients have more vulnerable soft-tissue bulk, and injuries sustained during the years of skill acquisition can interfere with the development of fine motor function, independence, and social participation^(4,8). At the same time, the strong regenerative capacity of hands of children and the generally better outcomes of nerve and tendon repair in children offer grounds for cautious optimism when injuries are recognised and treated promptly⁽⁴⁾.

Beyond the anatomical injury, glass punching in adolescents is fundamentally a behavioural and psychosocial problem. Punching glass is widely regarded as a form of impulsive, self-directed harm that typically occurs during episodes of anger, and it has been linked to higher rates of attention deficit, borderline personality traits, depression, and post-traumatic stress symptoms than accidental hand injuries⁽¹³⁾. Adolescence is characterized by still-maturing impulse control, which may predispose to such acts⁽⁵⁾. These observations argue for a management approach that addresses not only the hand but also the underlying emotional context: Identification of at-risk adolescents in the emergency department, provision of psychological support, anger-management strategies, and engagement of families. From a preventive standpoint, the literature consistently supports replacing accessible annealed glass with safety glass, which fractures into small, blunt fragments that stay glued to a plastic layer instead of shattering into sharp shards and has dramatically reduced serious glass injuries where mandated^(9,14).

Study Limitations

This study has several limitations. It is a retrospective, single-center series, and the sample size is modest, reflecting the relatively uncommon nature of the specific mechanism of this type of injury in children.

The retrospective design means that the validity of the analysis depends on the completeness of the operative and clinical records. Whereas data concerning some variables—such as alcohol or substance use, psychiatric history, and validated functional outcomes—were not consistently available and could not be analyzed. Long-term functional and sensory outcomes were also not captured. Despite these limitations, to our knowledge this is one of the few series to focus specifically on surgically treated glass-punching injuries in children and adolescents, and it provides a detailed account of the anatomical structures at risk that may inform both clinical assessment and prevention of these self-inflicted behaviors.

CONCLUSION

In conclusion, glass punching in children and adolescents cause predominantly male- dominant hand injury that frequently damages deep structures, including flexor tendons and major nerves and vessels. Apparently small wounds may conceal extensive injuries, so a low threshold of suspicion for formal surgical exploration is essential. Because these injuries are largely preventable and self-inflicted, management should extend beyond surgical repair to include recognition of the underlying psychosocial distress, anger management and psychological support for adolescents, family education, and reduction of risk of injury when broken through the use of safety glass.

Ethics

Ethics Committee Approval: The study was conducted following approval granted from the University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital Ethics Committee of Scientific Research (decision no: 2026-191, date: 29.04.2026).

Informed Consent: This is a retrospective study.

Declaration of AI Use: A large language model (Claude, Anthropic and Quillbot) was used for language editing, structuring of the manuscript, formatting of the reference list, and to run the statistical computations, which were verified by the authors in GraphPad Prism. It was not used to generate, alter or fabricate any patient data and is not listed as an author. All authors reviewed the final manuscript and accept full responsibility for its content.

Footnotes

Author Contributions

Surgical and Medical Practices: O.A., A.K., P.K., E.C., V.K., Y.C., Concept: O.A., A.K., V.K., Y.C., Design: O.A., A.K., E.C., Y.C., Data Collection or Processing: O.A., P.K., V.K., Y.C., Analysis or Interpretation: O.A., P.K., E.C., V.K., Y.C., Literature Search: O.A., P.K., E.C., Y.C., Writing: O.A., E.C., V.K., Y.C.

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