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The Relationship Between Etiology of Wrist Flexor Zone-5 Injuries and Anger Control

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ABSTRACT

Introduction: This study aimed to compare individuals who sustained flexor zone 5 wrist injuries due to punching glass versus accidental work injuries. It focused on anger scales, rehabilitation adherence, and treatment outcomes.

Methods: Forty-eight (9 females, 39 males) cases were reviewed retrospectively. Group A included patients injured by punching glass, while Group B consisted of work-related injuries. Data were collected using Spielberger's Anger scales and a sociodemographic form. Grip strength and QDASH scores were measured at the final follow-up, and the two groups were compared.

Results: Group A had 30 patients (7 females, 23 males), with an average age of 35.43 years (range: 20-56) and a follow-up period averaging 77.73 months (range: 23-135). Group B consisted of 18 patients (2 females, 16 males), with an average age of 46.44 years (range: 25-62) and an average follow-up period of 70.28 months (range: 18-148). Group A, comprising statistically significantly younger males with dominant hand injuries, showed higher uncontrolled anger scores, whereas Group B demonstrated higher anger control scores. There were no significant differences between groups regarding alcohol and/or drug usage, psychiatric history, education, trauma, grip strength, QDASH scores, or rehabilitation compliance.

Conclusion: The majority of injuries from punching glass involved young males with dominant-side injuries and significant anger levels. Although preoperative psychiatric evaluations are not carried out due to the urgent nature of these surgeries, postoperative care should involve hand surgeons, therapists, and psychiatric specialists using a biopsychosocial approach.

Keywords: Hand injury, flexor zone-5, punching glass, anger scales

Introduction

Hand and wrist injuries constitute approximately 15% of all injuries and represent some of the most common traumatic conditions encountered in emergency departments (1-3). Because tendons and neurovascular structures lie in close proximity to the skin and to one another at the wrist level, injuries in this region often involve multiple structures simultaneously (4).

Severe hand and wrist injuries are associated with psychological, social, and economic challenges, as well as long-term disability (5). Such injuries may result from intentional actions, such as punching glass in anger, or from accidental causes, including work, household, recreational, or transportation incidents (6). Approximately 2% of hand injuries caused by glass lacerations are related to punching glass or intentional self-harm (7).

Anger is a universal human emotion; however, when uncontrolled, it can profoundly disrupt an individual's well-being, as well as their social and professional relationships (8). Problems with anger regulation play a critical role not only in the occurrence of such injuries but also in treatment and rehabilitation outcomes. It has been suggested that biopsychosocial factors may influence the results of treatment in cases of intentional self-harm (9).

The aim of this study was to compare patients who sustained flexor zone 5 wrist injuries involving tendons and neurovascular structures caused either by punching glass or by accidental work-related trauma. The comparison focused on anger regulation, adherence to rehabilitation, and treatment outcomes.

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Methods

Data collection was conducted after obtaining approval from the Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University (approval number: E-10840098-772.02-5409, date: 01.09.2023). We retrospectively assessed patients who had undergone surgery for three tendon injuries and one nerve injury caused by a flexor zone 5 laceration. Exclusion criteria included patients with follow-up shorter than 18 months, patients who missed more than two of the eight scheduled follow-up visits in the first three months, patients with incomplete data, and patients who declined participation. Ultimately, 48 patients (9 women, 39 men) were included. All participants were adequately informed about the study objectives in accordance with the principles of the Helsinki Declaration, and written informed consent was obtained.

Patients were divided into two groups according to the cause of injury. Group A (n=30) included those injured by punching glass, while Group B (n=18) consisted of patients with unintentional work-related injuries. The mean age was 35.4 years (range, 20–56) in Group A (n=30, 7 women and 23 men) and 46.4 years (range, 25–62) in Group B (n=18, 2 women and 16 men). Injuries to the dominant hand were significantly more frequent in Group A (90%) compared with Group B (11%).

All patients received immediate surgical intervention to identify and repair the damaged structures. The same rehabilitation protocol was applied to all patients after surgery (Table 1).

Patients' anger levels were assessed postoperatively using Spielberger's scales, which include the Trait Anger scale and the Anger Expression Style scale. The Trait Anger scale contains 10 items that measure how frequently individuals experience feelings of anger. The Anger Expression Style scale consists of three subscales: Anger Out, Anger In, and Anger Control, each with 8 items. Responses are scored from 1 (very infrequent) to 4 (very frequent). Higher scores on the Trait Anger scale indicate greater overall anger, higher Anger Out scores reflect a tendency to express anger outwardly, higher Anger In scores suggest anger suppression, and higher Anger Control scores indicate a stronger ability to regulate and manage anger (9-11).

Patients' histories of psychiatric illness, prior trauma, income, education level, marital status, and alcohol or drug use were recorded. Correlation analyses were performed to examine the relationship between Trait Anger and Anger Expression Style scores and variables such as alcohol use, gender, employment status, income, smoking, education, and psychiatric history.

Functional outcomes were evaluated at the last control using grip strength and the Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH) questionnaire. Grip strength was measured three times with a Jamar dynamometer, with the elbow flexed at 90 degrees and the forearm and wrist in a neutral position. All measurements were performed by an experienced hand surgeon, and the average of the three values was recorded. QuickDASH scores were calculated from the validated 11-item questionnaire (12).

The two groups were compared based on demographic information, findings during surgery, Trait Anger and Anger Expression Style measures, adherence to the rehabilitation program, and functional outcomes.

Statistical Analysis

The data were analyzed with SPSS software (ver. 29.0; IBM Corp., Armonk, NY, USA). We analyzed the normality of the data using skewness and kurtosis values, which provided the data's symmetry and helped determine its adherence to a normal distribution. We utilized the Pearson chi-squared test and Fisher's exact test for categorical variables, the independent sample t-test for parametric variables, and the Mann Whitney-U test for non-parametric variables. Correlation analyses were performed with Pearson and Spearman tests. Quantitative data were provided as the mean ± standard deviation, and qualitative variables were shown as numbers (n), frequencies, or ratios. A p-value less than 0.05 was considered to have statistical significance.

Results

The analysis revealed significant differences between the two groups in terms of age and dominant-side involvement ($p<0.05$). However, no significant differences were observed between the groups with respect to gender distribution, the number of tendon, nerve, or vessel lacerations, history of alcohol, drug, or cigarette use, history of prior trauma, psychiatric history, marital status, or educational attainment (Table 2).

Table 1. Postoperative rehabilitation protocol

Time/stage	Application
Immobilization	Postoperatively, the wrist was immobilized in a dorsal splint at 15° flexion, with the metacarpophalangeal joints flexed between 40° to 60°, and the interphalangeal joints extended.
Postoperative day 3	Passive finger flexion in the splint was initiated.
First month	Weekly rehabilitation follow-up visits were scheduled. Active flexion was restricted.
End of month 1	The splint was removed and tendon-gliding exercises were initiated.
Month 2 (weeks 5-8)	Biweekly rehabilitation follow-up visits were scheduled.
Week 8	Light resistance training was initiated.
Week 12	Unrestricted activities were permitted.

Although Group A demonstrated higher mean scores for the Trait Anger, Anger Out, and Anger In subscales and Group B showed higher scores for Anger Control, these differences were not statistically significant ($p>0.05$) (Table 3).

No statistically significant correlations were found between Trait Anger or Anger Expression Style scores and alcohol use, gender, employment status, income level, or smoking behavior ($p>0.05$). The Anger Out subscale was significantly higher among university graduates compared with individuals with lower educational levels ($p<0.05$). Similarly, the Anger In subscale was significantly higher in patients with a documented psychiatric history ($p<0.05$).

Clinical outcomes, follow-up duration, and adherence to rehabilitation are summarized in Table 4. There were no statistically significant differences between the groups in any of these parameters ($p>0.05$).

Table 2. Demographic and injury-related characteristics of the two study groups. Values that exhibit significant difference ($p<0.05$) are bolded

Parameters	Group A (n=30)	Group B (n=18)	p value
Age Years: mean (max-min)	35.43 (20-56)	46.44 (25-62)	**0.001**
Gender: woman/man	7/23 23.3%/76.7%)	2/16 (11.1%/ 88.9%)	0.451
Dominant side involvement number (percent)	27 (90%)	2 (11%)	**0.001**
Number of injured tendons	7.03±2.69 (3-11)	6.33±2.97 (3-11)	0.406
Number of injured nerves	1.26±0.44 (1-2)	1.27±0.46 (1-2)	0.935
Number of injured arteries	0.87±0.62 (0-2)	0.83±0.51 (0-2)	0.850
Marital status/married (%)	63.3%	88.9%	0.085
Alcohol usage	6 (20%)	3 (16.7%)	1.000
Substance usage	0 (0%)	1 (5.6%)	0.375
History of psychiatric illness	4 (13.3%)	1 (5.6%)	0.637
History of similar trauma	3 (10%)	0 (0%)	0.282
Smoking	19 (63.3%)	8 (44.4%)	0.240
Education status/high school + university graduate	14 (46.7%)	5 (27.8%)	0.235

Min: Minimum, Max: Maximum

Table 3. Results of two study groups regarding anger scales

Trait Anger and anger expression style scales	Group A (n=30) (Mean ± SD)	Group B (n=18) (Mean ± SD)	p value
Trait Anger	17.73±4.6	16.94±4.3	0.543
Anger Out	15.30±4.9	14.33±4.1	0.522
Anger In	13.20±3.8	12.61±2.6	0.748
Anger Control	23.03±4.8	25.11±3.8	0.200

SD: Standard deviation

Table 4. Study group results according to the follow-up process and outcomes. There were no significant differences between the groups in relation to these factors

Parameters	Group A (n=30)	Group B (n=18)	p value
Follow-up time months: mean (min-max)	77.73 (23-135)	70.28 (18-148)	0.524
Grip strength (kg) mean (min-max)	29.10 (5-54)	28.56 (8-56)	0.892
% Grip strength of the contralateral hand	73.72%	67.34%	0.263
QDASH mean (min-max)	7.41 (0-65.9)	11.1 (0-27.3)	0.282
Number of patients not attend at least one scheduled postoperative rehabilitation appointment	7 (23.3%)	1 (5.6%)	0.229

Min: Minimum, Max: Maximum

Discussion

Our findings demonstrated significant differences between the groups regarding age and dominant-hand involvement. Patients injured by punching glass were younger, with most injuries affecting the dominant hand. These results are consistent with previous studies, which report that 78-92% of glass-punching injuries occur in young men and that 70-94% involve the dominant hand (5,7,13-16). The predominance of such injuries in young males may be related to intermittent explosive disorder, a psychiatric condition characterized by uncontrolled violent impulses leading to self-harm and aggression (14,16). By contrast, patients with work-related injuries more often sustained trauma to the non-dominant hand, which reflects occupational patterns described in the literature (17-21).

With respect to anger measures, we observed no statistically significant differences in Trait Anger, Anger Out, Anger In, or Anger Control scores between the two groups. This finding is consistent with Kural et al. (22), who also reported no significant differences in anger scales among patients with fifth metacarpal neck fractures. However, other studies have demonstrated higher levels of anger, impulsivity, and psychological distress in patients with self-inflicted hand injuries (9,13,23). These discrepancies may reflect differences in study design or patient reporting behaviors, as underreporting, social desirability bias, and regret following impulsive actions may all influence how patients complete anger questionnaires (24). A potential explanation for the absence of significant differences in anger scale outcomes among patient cohorts in our study may be attributed to the patients' tendency to give limited responses to the scales.

Alcohol use has been strongly associated with glass-related hand injuries in numerous studies, with reported prevalence ranging from 15.5% to 100% (6,13,15,25-27). Alcohol consumption is frequently cited as a contributing factor to impulsive behaviors, including punching glass, and is often considered a major risk factor for intentional upper extremity injuries. In our cohort, however, alcohol use was comparatively low and did not differ significantly between groups. This finding likely reflects the influence of cultural and religious norms in our population, where alcohol consumption is generally less common than in many of the regions where earlier studies were conducted. The comparatively low prevalence of alcohol use may therefore help explain the discrepancy between our findings and those of previous reports.

Similarly, psychiatric illness and drug use have been highlighted in the literature as important risk factors for repeated intentional injuries, particularly in younger male populations (14,28). In our study, no significant differences were found between the groups regarding psychiatric history or substance use. It should be noted, however, that information on drug use was based on self-reports rather than laboratory confirmation, which may have led to underreporting due to social stigma and legal concerns. This limitation should be considered when interpreting our results, as undetected substance use could potentially confound the relationship between psychiatric status, impulsivity, and the risk of intentional injury.

No significant difference was found between the two groups regarding their psychiatric disorder history. This result may be attributed to the limited sample size of patients in our investigation, highlighting the necessity for larger case series studies. The administration of treatment to patients with a previous psychiatric disorder may have resulted in a decrease in their Anger Out scores (29). Nonetheless, those with histories of psychiatric disorder had a considerably higher score on the Anger In subscale. The interdependent correlation among alcohol use, drug abuse, and mental disorders as predisposing factors for intentional injury should not be disregarded, and individuals seeking medical care in the emergency department due to intentional injuries should be assessed within this framework.

Tendons and neurovascular structures are the most commonly affected components in wrist injuries, often requiring multiple surgeries and prolonged rehabilitation (13,16). Clinical outcomes and hand function are also influenced by psychological factors such as anger and impulsivity (28). Patients injured by punching glass are typically younger and more often sustain dominant-hand injuries, which may result in greater long-term functional loss compared with accidental injuries (5). Prior studies have reported worse QDASH scores and higher discontinuation rates in intentional injury groups (9,28). While some research has suggested lower educational attainment among patients with punching-glass injuries (16), our study found no statistically significant differences in education level, QDASH scores, or rehabilitation compliance between groups. The slightly higher education level observed in the intentional injury group may reflect the predominance of manual laborers in the accident group.

Furthermore, we observed that the Anger Out subscale scores were higher among individuals with university degrees. Their elevated levels of knowledge may result in more unbiased responses on the scale. The absence of a statistically significant difference in postoperative rehabilitation compliance across the study groups may be ascribed to elevated educational attainment, rapid remorse experienced following impulsive behavior in a fit of anger within the intentional damage group.

Study Limitations

The primary limitation of this study was the relatively small sample size, which may have reduced the statistical power and limited the generalizability of the findings. Another limitation is the potential response bias in patient-reported questionnaires. In addition, the absence of routine laboratory testing for drug and alcohol use, with complete reliance on self-reported data, may have introduced further bias.

Conclusion

Patients injured by punching glass are predominantly young men, most with injuries to the dominant hand, and elevated scores on the Trait Anger, Anger Out, and Anger In scales. Because urgent surgical intervention is often required, preoperative psychiatric evaluation is rarely feasible. These patients should therefore be approached from a biopsychosocial perspective during postoperative follow-up, rehabilitation, and potential reoperations. Close collaboration among psychiatrists, hand surgeons, and hand therapists is essential to optimize evaluation and treatment planning.

Ethics

Ethics Committee Approval: The study was approved by the Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University (approval number: E-10840098-772.02-5409, date: 01.09.2023).

Informed Consent: Written informed consent was obtained from all participants.

Footnotes

Authorship Contributions: Surgical and Medical Practices - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.; Concept - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.; Design - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.; Data Collection or Processing - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.; Analysis or Interpretation - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.; Literature Search - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.; Writing - K.U., E.A., H.K.U., Z.M.A., K.G., M.M.E.

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