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Effect of examination findings on forensic report results in traumatic cutaneous-subcutaneous tissue injuries: a retrospective study

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ABSTRACT

Aims: Accurate recording of the findings obtained during the first examination of forensic cases is of great importance for the forensic reports to be prepared afterwards. The aim of this study was to determine whether there is a difference between the initial and final examination of cutaneous injuries after trauma, and how this difference affects the result of the forensic report.

Methods: The study was designed as a retrospective analysis based on forensic reports prepared between January 1, 2020, and July 20, 2024, at the Department of Forensic Medicine, Gülhane Training and Research Hospital, University of Health Sciences, Türkiye. A total of 1,221 cases with cutaneous-subcutaneous traumatic tissue injuries were eligible for inclusion in the study.

Results: Of the 1,221 cases, 84.1% were male and the mean age was 36.7 years. 51.9% (n=634) of the injuries were “NOT MILD enough to be resolved with simple medical intervention”, and the injury was considered to be a facial fixed scar in 3.3% of cases. In 239 of the 365 cases re-examined some discrepancies in lesion size were found; the size of the lesions was smaller than indicated in the medical records in 65.9%, while it was larger in 34.1% of these cases. These differences in lesion size were found to change the outcome of the forensic report in 28 cases ($\chi^2 = 617.24$, $p<0.001$).

Conclusions: Our study revealed that the majority of physicians inaccurately reported the wound sizes of forensic cases, either as larger or smaller than they actually were. Since this situation will change the outcome of the forensic report and impact the judgment process, victimization will be inevitable. In order not to cause any victimisation in forensic cases, physicians should prepare a report using metric measuring instruments for the dimensions of cutaneous lesions in physical examination.

Introduction

Trauma is defined as physical or psychological harm to a person. Physical trauma includes cases such as assault, stabbing, traffic accidents, falls, burns, torture, sexual offences, neglect, and abuse. Each of these is a forensic case (1). The section on intentional injury offences in the Turkish Penal Code (TPC) (2) stipulates some penalties for those who intentionally harm a person’s body. In order to make a judgement regarding these penalties, a forensic report is needed. In forensic medicine practice, these forensic reports have two stages:

first, the "General Forensic Examination Report" prepared by the physician who first saw the patient; second, the forensic report indicating the last condition of the patient, which is usually prepared by forensic medicine specialists and is used in legal proceedings. The injury weights in all these forensic reports should be organized using "Guidelines for the Evaluation of Injury Crimes Defined in the TPC in Terms of Forensic Medicine" (3).

Since the emergency departments of hospitals are the first center where forensic cases are presented, the obligation to report forensic cases and the responsibility for preparing forensic reports falls largely on emergency physicians. A physician who encounters a forensic case should definitely prepare a forensic report after performing medical intervention on the patient. In these forensic reports, which are organised under the name of "General Forensic Examination Form" the entire physical examination of the patient should be written down and the results of the examinations and consultations should be prepared completely (4).

Cases in which forensic medicine specialists are requested by the judicial authorities to prepare a forensic report in accordance with Articles 86-87 of the TPC (2) can be submitted both through the relevant file and by outpatient application to forensic medicine polyclinics. The findings of the initial examination of the forensic case in the emergency department and the final examination performed by the forensic medicine specialist are important in preparing a forensic report.

One of the major problems faced by forensic medicine experts is the lack of medical documentation in cases where a forensic report is requested, and the discrepancies between the initial and final examination findings due to the initial findings not being properly recorded. These disputes may have a direct impact on the outcome of the forensic report and result in individuals losing their legal rights.

The aim of this study is to analyse the differences between the initial examination findings documented in general forensic examination reports and the final examination findings recorded in forensic medicine outpatient clinics in forensic cases with cutaneous-subcutaneous injuries. In addition, it is investigated whether these differences affect the outcome of forensic reports.

Methods

Study design and patient selection

The study was designed as a retrospective analysis based on forensic reports prepared between January 1, 2020, and July 20, 2024, at the Department of Forensic Medicine, Gülhane Training and Research Hospital, University of Health Sciences, Türkiye. A total of 7,167 forensic reports were analysed. A total of 1221 patients with post-traumatic cutaneous and subcutaneous tissue injuries were eligible for inclusion in the study. Only the initial examination findings of patients with more than one admission [evaluation of fixed facial scar (FFS), evaluation of sensory-organ dysfunction or loss of function, etc.] were included in the study. This study was conducted with the approval of the University of Health Sciences Türkiye, Gülhane Scientific Research Ethics Committee (decision number: 2024-587, date: 10.12.2024).

Data collection and data assessment

The study evaluated parameters such as age, gender, origin of the incident, lesion size, whether the injury was mild enough to be treated with simple medical intervention (SMI), whether it was a fixed scar on the face, the differences in lesion size between the previous medical documents relating to the incident and our own examination, and whether these differences affected the outcome of the forensic report.

The classification criteria for the size of trauma-related cutaneous-subcutaneous lesions were determined according to the data specified in Table 2 (traumatic changes involving cutaneous-subcutaneous-muscular tissue) of the "Guidelines for the Evaluation of Injury Crimes Defined in the TPC in Terms of Forensic Medicine (Association of Forensic Medicine Specialists, June 2019)" (3).

According to the guidelines for the evaluation of injury crimes defined in the TPC in terms of forensic medicine, Table 2, which presents Traumatic Changes Involving Cutaneous-Subcutaneous-Muscular Tissue is provided blow (3):

<5 cm as a single lesion in the scalp and facial area, <10 cm in total, <10 cm as single lesion in other parts of the body, in total <20 cm cutaneous-subcutaneous injuries	MILD
≥5 cm as a single lesion in the scalp and facial area, ≥10 cm in total, ≥10 cm as a single lesion in other parts of the body, in total ≥20 cutaneous-subcutaneous injuries	NOT MILD

Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences for Windows, version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were presented as mean or median (minimum–maximum), while categorical variables were presented as number and percentage. The Shapiro-Wilk test was used to assess the normality of continuous variables, while the Chi-square and Binomial tests were applied to evaluate categorical data and proportions, respectively. A p-value of <0.05 was considered statistically significant.

Results

Of the 1221 patients with trauma-related cutaneous and subcutaneous tissue injuries, 84.1% (n=1027) were male, 15.9% (n=194) were female, and the mean age was 36.7 years (±16.2) (Figure 1).

It was found that 29.9% (n=365) of the cases were examined in our forensic medicine outpatient clinic, while 70.1% (n=856) received a forensic report via case files. Injuries occurred most frequently in March with a rate of 11.5% (n=141) and least frequently in August with a rate of 2.3% (n=28) (Figure 1).

When the cases were analysed according to the origin of the injury, it was determined that the most common causes of injury were assaults (n=455, 37.3%), traffic accidents (n=343, 28.1%), and penetrating stab wounds (n=341, 27.9%). The origin of the injuries is shown in Figure 2.

When the cutaneous-subcutaneous wound characteristics of all cases were evaluated [according to the article "Traumatic changes involving the cutaneous-subcutaneous-muscular tissue, Table 2, (shown in methods section)" in the guideline for the evaluation of injury crimes defined in the Turkish penal code in terms of forensic medicine];

a. 7.7% (n=94) of the cases had a cutaneous-subcutaneous lesion ≥5 cm as a single lesion on the scalp and face,

b. 43.6% of the cases (n=532) had cutaneous-subcutaneous lesions of less than 10 cm in total on the scalp and face,

c. 5.8% of the cases (n=70) had cutaneous-subcutaneous lesions of ≥10 cm in total on the scalp and face,

d. 1.4% of the cases (n=17) had ≥10 cm cutaneous-subcutaneous lesions as a single lesion in other parts of the body (no lesion on the face and scalp),

e. 39.5% of the cases (n=482) had cutaneous-subcutaneous lesions less than 20 cm in total on the whole body,

f. 2.1% of the cases (n=26) had cutaneous-subcutaneous lesions of ≥20 cm in total distributed over the whole body.

In 3.3% (n=41) of all cases (n=1221), the injury was considered to be a FFS. The frequency of facial fixed scars according to lesion size and location is shown in Table 1.

It was found that 51.9% (n=634) of the injuries were "NOT MILD enough to be resolved with SMI" and 48.1% (n=587) were "MILD enough to be resolved with SMI".

A comparison of the initial examination findings (general forensic examination report and/or patient epicrisis notes) and the final examination findings of 365 patients who were examined in our forensic polyclinic and received a forensic report revealed that in 126 (34.5%) cases, there was no difference in lesion size, whereas in 239 (65.5%) cases, there was a difference in lesion size ($p<0.001$). The mean time elapsed between the first presentation to the emergency department (date of the incident) and the forensic medicine outpatient clinic examination, of the 365 cases was 48.4 days [minimum (min.) 0, maximum (max.) 522].

In 158 (65.9%) of 239 patients with a difference in lesion size, the lesion detected at the last examination was smaller than the lesion detected at the first examination in the previous medical records, and in 81 (34.1%) patients, the lesion detected at the last examination was larger than the lesion detected at the first examination ($p<0.001$). A statistically significant association was found between the direction of lesion size change (increase or decrease) and the alteration in the forensic report outcome ($\chi^2=619.37$, df = 4, $p<0.001$), as well as between the lesion size change category (increase, decrease, or none) and forensic classification outcome ($\chi^2=617.24$, df=6, $p<0.001$) (Figure 3).

In 9.4% (n=15) of 158 cases in which the final examination at our forensic medicine outpatient clinic revealed lesions smaller in size than the initial examination findings recorded in the patient's medical records, it was found that the measurement result at the final examination had a direct effect on the forensic report result and the forensic report result changed from "NOT MILD enough to be resolved with simple medical intervention" to "MILD enough to be resolved with simple medical intervention" ($p<0.001$). The median time interval between the initial emergency department

Table 1. Distribution of facial fixed scars according to lesion size and location

	FFS (+)	FFS (-)	Total
≥5 cm cutaneous-subcutaneous lesion as a single lesion on the scalp and face	11 (11.7)	83 (88.3)	**94 (100)**
Cutaneous-subcutaneous lesions under 10 cm in total on the scalp and face	11 (2)	521 (98)	**532 (100)**
Cutaneous-subcutaneous lesions ≥10 cm in total on the scalp and face	13 (18.5)	57 (81.5)	**70 (100)**
Cutaneous-subcutaneous lesions less than 20 cm in total on the body	4 (0.8)	478 (99.2)	**482 (100)**
Cutaneous-subcutaneous lesions ≥20 cm in total on the body	2 (7.6)	24 (92.4)	**26 (100)**
No lesions on the face and scalp	-	-	**17**
Total	**41 (3.3)**	**1163 (96.7)**	**1221 (100)**

Data are presented as n (%).
FFS: Fixed facial scar

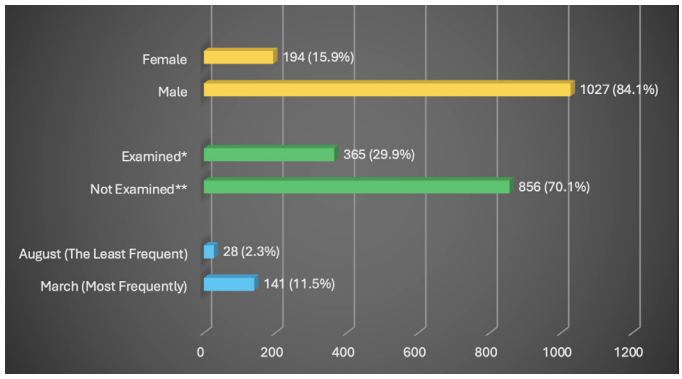

Figure 1. Gender of the cases, whether the cases were examined in our polyclinic or not, and the most and least frequent month of incidents.
*The cases were examined in our Forensic Medicine outpatient polyclinic.
**The cases were not examined, the forensic reports were prepared through the case files

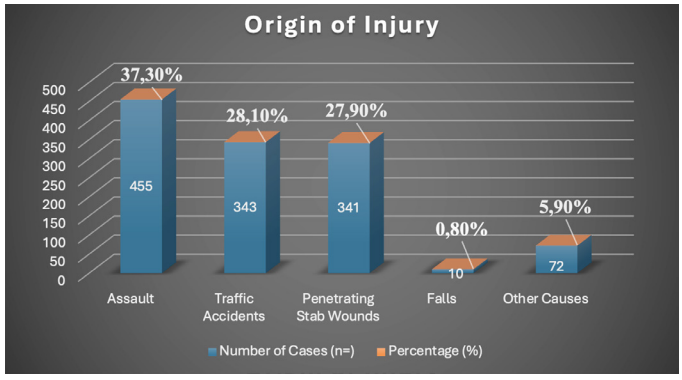

Figure 2. The origin of the injuries

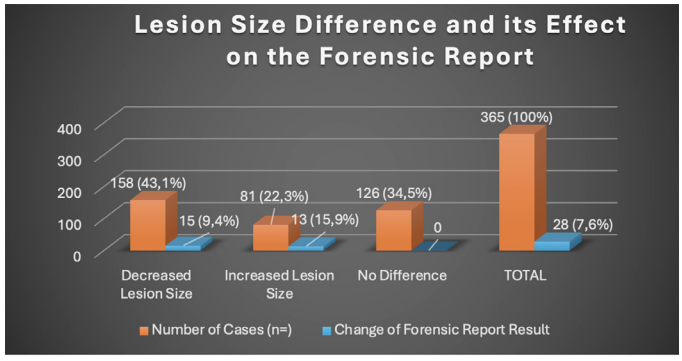

Figure 3. The difference between the lesion sizes in the final examination and the initial examination findings reported in the medical records and the effect of this difference on the forensic report result. A statistically significant association was observed between lesion size change direction and change in forensic report outcome (Chi-square test, χ^2=619.37, df=4, p<0.001).

examination and the forensic medicine outpatient clinic examination for these 15 cases was 8.0 days.

In 15.9% (n=13) of the 81 cases where the lesion size measured at our final examination was larger than that reported in the patient's initial medical records, the measurement result was found to have a direct impact on the outcome of the forensic report, and the report result of "MILD enough to be resolved with simple medical intervention" was changed to "NOT MILD enough to be resolved with simple medical intervention" (p<0.001) (Figure 3). The median interval between the first examination in the emergency department and the last examination in our outpatient clinic of these 13 cases was 5.0 days. In 7.6% (n=28) of the 365 cases we examined, the difference between the examination results was found to have changed the outcome of the forensic report (χ^2=617.24, df = 6, p<0.001) (Figure 3).

Discussion

The present study revealed that the majority of patients with trauma-related cutaneous-subcutaneous injuries had lesions located on the face, and in approximately half of the cases, these injuries were NOT MILD enough to be resolved with a SMI. In addition, it was determined that in the majority of the patients examined by the Department of Forensic Medicine, the lesions were different in size from those stated in the initial examination of the patient (65.9% smaller, 34.1% larger). This lesion size difference had a direct effect on the result of the forensic report in some cases, leading to changes in the report. In light of all these findings, it was revealed that the majority of physicians who examined forensic cases recorded the lesions with approximate methods and without measuring them clearly.

Articles 86 and 87 of the TPC cover the details of the proceedings related to intentional injury offences. Article 86 states that "A person who intentionally inflicts pain on the body of another person or causes impairment of health or perception shall be sentenced to imprisonment from one year to three years" and "If the effect of the act of intentional injury on the person is mild enough to be resolved with a SMI, upon the complaint of the victim, imprisonment from four months to one year or a judicial fine shall be imposed" (2).

Therefore, forensic examination is of great importance for the accurate description of the lesions and the correct measurement of their dimensions in the preparation of a strict forensic report according to Articles 86-87 of the TPC. Since the wound size is important in cutaneous-subcutaneous injuries according to the TPC, if the clinician reports the wound size as smaller than the actual wound size, the offender may be sentenced to a lesser penalty, whereas if the wound size is reported as larger than the actual wound size, the offender may be sentenced to a higher penalty than he/she should receive. During the examination, care should be taken to remove all clothing and to examine the entire body, including the palms of the hands, the soles of the feet, and the mucous membranes of the mouth. During the examination, the location and detailed characteristics (length, width, depth, colour, etc.) of each wound should be specified, metric measuring instruments should be used, and photographs should be taken if possible (5).

In their study, Turla et al. (6) found that 30.5% of the forensic reports prepared in emergency departments did not include

the presence or absence of external traumatic lesions, and in almost half of the cases where external lesions were described, the lesion descriptions were not as detailed as they should be in forensic reports. In our study, we found that in 65.5%, (n=239) of the 365 cases we examined, there was a difference between the lesion sizes measured in the general forensic examination form and the lesion sizes measured in our own examination.

A reduction in wound size during and as a result of wound healing is an expected finding (7). The median time between the first presentation to the emergency department and the forensic medicine polyclinic examination of the 365 cases was 11.5 days.

However, in a significant number of our cases (n=81, 22.3%), the fact that the lesion was found to be larger than initially recorded cannot be explained by this reasoning. Considering the workload, the high number of patients, and the fact that the first priority of emergency physicians is to save lives, emergency physicians tend to give an estimated measurement instead of measuring the lesions with a ruler. However, it should not be forgotten that patients may lose their legal rights for this very reason (8).

In the guidelines for the evaluation of injury crimes defined in the Turkish criminal code in terms of forensic medicine; “Injuries involving the scalp and facial area ≥5 cm as a single lesion, ≥10 cm in total, ≥10 cm as a single lesion in other parts of the body, ≥10 cm as a single lesion, ≥20 cm in total, involving the cutaneous-subcutaneous injuries are NOT MILD enough to be solved with SMI” (3). Lesion size is particularly important for lesions on the face and scalp, and small errors in measurement can lead to a change in the forensic report. In the measurements we made in our study, we found that in 7.6% (n=28) of the 365 cases examined, the difference in lesion size was large enough to change the outcome of the forensic report. In addition, this change in the forensic report outcome was statistically associated with both the direction of the lesion size change and the lesion size change status.

In 53.3% (n=15) of the 28 cases where the forensic report result was changed, it was found that the lesion sizes recorded in the medical documents from the initial examination were actually smaller, as a result of the examination carried out in our forensic medicine polyclinic. Therefore, while the results of the first forensic report issued through the file of these cases were “NOT MILD enough to be resolved with SMI”, it had to be changed to “MILD enough to be resolved with SMI” as a result of the forensic medicine polyclinic examination.

Wound healing is a dynamic process consisting of four continuous, overlapping and precisely programmed phases. In adult humans, optimal wound healing involves the following events: rapid haemostasis, appropriate inflammation, mesenchymal cell differentiation, proliferation, and migration of mesenchymal cells to the wound site, appropriate angiogenesis, rapid re-epithelialization (re-growth of epithelial tissue over the wound surface), and appropriate synthesis, cross-linking, and orientation of collagen to provide strength to the healing tissue (9). In general, several local and systemic factors can affect wound healing. Oxygenation, infection, foreign bodies and venous insufficiency are some of the local factors that influence wound healing, while age and sex, sex hormones, stress, ischaemic diseases such as diabetes, hereditary healing disorders, obesity, alcoholism, smoking and diet are some of the systemic factors that influence wound healing (10).

Due to the specific cutaneous structure and blood vessel density of this region in maxillofacial injuries, healing of cutaneous-subcutaneous injuries and shrinkage of the wound are expected outcomes. In addition, factors like the presence of infection and receipt of treatment during the wound healing process are also important. The effect of the healing process on wound tissue shrinkage may appear to contradict our findings. In cases where the size of the lesion decreased and changes occurred as a result of the forensic report, the average time between the initial and final examinations was 8.0 days. This shows that most of these inconsistencies occurred despite the relatively short follow-up period.

In addition, an injury deep enough to involve cutaneous-subcutaneous tissue, even as it begins to heal and decrease in size, is expected to show some discolouration compared to uninjured cutaneous tissue. It is therefore easy to distinguish between a healed injury and uninjured cutaneous tissue on final examination, especially in the first month; and a detailed examination of the scar tissue can give an idea of the original wound size.

Therefore, in the cases where we found a decrease in wound size, both that the majority of the cases were examined in the early period (first 15 days) and that there was a significant change in colour between the injured and uninjured cutaneous tissue suggest that the wounds were described without metric measurements in the emergency departments rather than in the healing phase of the injury. In cases where changes were made to the forensic report because the final lesion size was larger than initially recorded, the median time between emergency department and forensic medical examinations was 5.0 days. This is further evidence that these inconsistencies are not solely due to long-term wound changes, but rather to initial recording errors.

Similarly, in 46.7% (n=13) of the 28 cases, the lesion sizes reported in the medical records were found to be larger during the examination performed in our outpatient clinic. In these cases, while the results of the first forensic report issued through the case file were “MILD enough to be resolved with SMI”, they had to be changed to “NOT MILD enough to be resolved with SMI” as a result of the forensic medicine polyclinic examination.

There is no study in the literature that examines the impact of forensic findings on the outcome of the forensic report in a

way comparable to our study. The situation mentioned in the previous paragraphs may lead to the loss of rights for the victim or the perpetrator in both criminal and compensation cases, and may result in a person receiving less or more punishment.

A study conducted by Şener et al. (11) aimed to determine the incompletely defined wound sizes in forensic reports issued in primary health care institutions and emergency departments. They reported that there were difficulties in the preparation of reports in 93 cases because it was not specified whether cutaneous-subcutaneous tissue and muscle tissue injuries were present. We believe that incomplete information about wound depth in some of the reports we examined during the archive search phase of our study and errors such as defining a sharp object wound as a laceration may lead to similar difficulties in report writing.

In our study, cases considered to be FFSs represented 3.3% (n=41) of all cases. Güven et al. (12) found this rate to be 2.6% in their study. In a study by Kürkçü et al. (13), the rate of facial fixed scars was found to be significantly increased in lesions with scar lengths greater than 2 cm. This significant finding between the size of a lesion within the limits of the face and its potential to cause a facial fixed scar emphasizes the importance of accurate measurement of lesion size.

This study has several limitations. The biggest limitation of the study is the acceptance of the accuracy and completeness of the available medical records. In addition, the time intervals between the initial and final examinations cannot be standardised or estimated. Furthermore, since the general forensic examination reports were prepared in emergency departments, lesion measurements were mostly made by estimation without the use of metric instruments, which likely leads to inconsistencies in the medical records.

Conclusion

This study highlights the discrepancies between initial and final forensic examinations in cases of cutaneous-subcutaneous tissue injuries and their impact on forensic report outcomes. The most frequent reason for these discrepancies appears to be the lack of detailed and standardized documentation during the initial emergency department evaluations. The high workload in emergency settings may lead to estimations rather than precise measurements, potentially resulting in discrepancies that can affect judicial outcomes. Our results underscore the necessity for standardized forensic documentation practices, including the systematic use of metric measuring instruments and photographic evidence.

Additionally, we propose a revision of the forensic injury classification criteria outlined in the TPC. The current classification, which differentiates injury severity based on a single-lesion threshold, (≥5 cm for the face and ≥10 cm for other body parts) may not adequately reflect the actual impact of multiple smaller injuries. Our suggestion for this problem, which is frequently encountered in forensic medical practice, is that it would be more appropriate to remove the phrases “≥5 cm as a single lesion” and “≥10 cm as a single lesion” from the guideline. Instead, use the guideline criterion of “≥10 cm of injury involving the scalp and facial area” and “≥20 cm of cutaneous-subcutaneous injury involving the cutaneous-subcutaneous area in other parts of the body” for a more comprehensive and fair assessment.

Ethics

Ethics Committee Approval: This study was conducted with the approval of the University of Health Sciences Türkiye, Gülhane Scientific Research Ethics Committee (decision number: 2024-587, date: 10.12.2024).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S., Concept: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S., Design: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S., Data Collection or Processing: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S., Analysis or Interpretation: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S., Literature Search: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S., Writing: H.B., D.G.Ç., B.K., H.C.A., S.Ö., A.S.

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