



The Importance of Radiology Consultation in Forensic Report Preparation: A Retrospective Study

Adli Rapor Düzenlemede Radyoloji Konsültasyonunun Önemi: Bir Retrospektif Çalışma

✉Nusret Ayaz¹, ✉Orhan Meral², ✉Mustafa Doğan³

¹Niğde Training and Research Hospital, Department of Forensic Medicine, Niğde, Turkey

²Çiğli Training and Research Hospital, Department of Forensic Medicine, İzmir, Turkey

³Ömer Halisdemir University Faculty of Medicine, Department of Forensic Medicine, Niğde, Turkey

Copyright © 2020 by authors and Medical Records Publishing Inc.

Abstract

Amaç: The aim of the present study is to draw attention to the importance of radiology consultation which is needed during medical evaluation and report preparation process.

Material and Method: The records of 72 cases who applied to Forensic Medicine outpatient clinic between June 2016 and October 2019 and whose consultations were requested from Radiology department to prepare a forensic report were examined retrospectively. Age and gender of the cases, the type of event, the date of the report, the reason for requesting consultation and the impact of the consultation on forensic report were investigated.

Results: Of the 72 cases included in the study, 58 (80,6%) were male, while 14 (19,4%) were female. The cases were between the ages of 17 and 78 and mean age was calculated as 36,6 (st ±:16.1) years. It was found that 43 (58,9%) of the consultations were requested because of "contradiction between the examination report prepared by radiology department and medical reports prepared by emergency or other clinical physicians". Previous imaging reports of 21 (48%) of these consultations were changed in accordance with the opinions of physicians of emergency service or other clinics.

Conclusion: According to the legal legislation of our country, physicians are obliged to report judicial authorities and to prepare a judicial report if requested when they come across a judicial case. In order for forensic medical evaluation to be made in the most appropriate way and to prepare the forensic report, all examinations and treatments should be completed first. In addition, if there is a contradiction in the medical reports, examinations or consultation from the related clinical branch may be requested. Consultations make a significant contribution to the most accurate completion of forensic medical evaluation and the prepared medical report.

Anahtar Kelimeler: Forensic medicine; forensic report; radiology consultation

Öz

Aim: Bu çalışmada, adli tıbbi değerlendirme ve rapor düzenleme sürecinde ihtiyaç duyulan Radyoloji konsültasyonunun önemine dikkat çekilmesi amaçlanmıştır.

Materyal Metod: Haziran 2016 – Ekim 2019 tarihleri arasında Adli Tıp polikliniğine başvuran ve adli rapor düzenlenebilmesi için Radyoloji bölümünden konsültasyon istenen 72 olguya ait kayıtlar retrospektif olarak incelenmiştir. Olguların yaşı ve cinsiyeti, olayın türü, düzenlenen raporun tarihi, konsültasyon isteme nedeni, konsültasyon sonucunun adli rapora etkisi araştırılmıştır.

Bulgular: Çalışmaya dahil edilen 72 olgunun 58'i (%80,6) erkek, 14'ü (%19,4) kadındır. Olgular 17-78 yaş aralığında olup yaş ortalaması 36,6 (st ±:16.1) yıl olarak hesaplanmıştır. Konsültasyonların 43'ünün (%58,9) "Radyoloji bölümünce düzenlenen tetkik raporu ile acil veya diğer klinik hekimlerince düzenlenen tıbbi kayıtlarda oluşan çelişki" nedeniyle istendiği belirlenmiştir. Bunlardan 21'inin (%48) daha önce düzenlenen görüntüleme raporu acil veya diğer klinisyen görüşüne uygun şekilde değiştirilmiştir.

Sonuç: Ülkemiz yasal mevzuatına göre hekimler adli olguya karşılaştıkları halinde bu durumu adli mercilere bildirmek ve istenilmesi halinde adli rapor düzenlemekle yükümlüdür. Düzenlenen bu raporlar soruşturma ve yargılama aşamalarında büyük öneme sahiptir. Adli tıbbi değerlendirmenin en uygun şekilde yapılabilmesi ve adli raporun düzenlenebilmesi için öncelikle tüm tetkik ve tedavilerin tamamlanması gerekmektedir. Bunun yanı sıra tıbbi kayıtlarda çelişki söz konusu ise tetkik veya ilgili klinik branşlardan konsültasyon istenebilmektedir. Konsültasyonlar, adli tıbbi değerlendirmenin ve düzenlenen adli raporun en doğru şekilde tamamlanmasına önemli katkı sağlamaktadır.

Keywords: Adli tıp; adli rapor, radyoloji konsültasyonu

Geliş Tarihi / Received: 11.08.2020 **Kabul Tarihi / Accepted:** 04.09.2020

Sorumlu Yazar /Corresponding Author: Nusret Ayaz, Niğde Training and Research Hospital, Department of Forensic Medicine, Niğde, Turkey E-mail: nusretayaz@gmail.com

INTRODUCTION

The science of radiology has been playing an active role in medicine since the invention of X rays and imaging methods are used as an important diagnostic tool in today's medical practices (1). In trauma cases, radiological imaging methods requested after examination are among the first used diagnostic tools (2). Trauma cases have forensic character. Following the referral of the case that is exposed to trauma to the health institution, healthcare professionals are obliged to notify the judicial authorities (3). The notification can be oral or written. After the notification, the judicial authorities are requested to prepare a report stating the medical state of the case. The physician who is asked to prepare a judicial report is obliged to fulfil this duty as an expert (4). In the evaluation of crimes of injury in terms of forensic medicine, the guide entitled "*Evaluation of criminal injuries defined in Turkish Criminal Code (TCC) in terms of forensic medicine*" was prepared in 2005 in order to provide a nationwide standard in the forensic evaluation of criminal injuries and it was updated in 2013 and 2019 (5).

Diagnosis made to trauma cases by the evaluation of imaging tests requested in emergency services by emergency physicians or other clinic physicians and Radiology final report may differ from time to time. It has been reported that even as a result of the evaluation of the same test by more than one radiologist, different reports can be issued and thus different results may appear (6). This contradictory situation causes problems in the preparation of forensic reports. In order to carry out a healthy and fair process, final results should be written while writing a forensic report and contradictory expressions should be avoided (6,7).

During the process of forensic medical evaluation and report writing, all medical examination and observation documents are evaluated together. Different medical results in medical records cause contradiction during the report preparation process, and this contradiction causes the prolongation of report preparation process and indirectly the trial process (7).

The aim of the present study is to draw attention to the effects of radiology consultation requested due to the contradiction between the imaging report and the diagnosis made by the emergency physician or other clinical physicians on forensic medical evaluation. Forensic report preparation process and trial process with forensic report result and to contribute to literature with the results obtained.

MATERIAL and METHODS

The present study is a retrospective study. The records of 72 cases who applied to Forensic Medicine outpatient clinic between June 2016 and October 2019 and whose consultations were requested from Radiology department to prepare a forensic report were examined. Age and gender of the cases, the type of event, the date of the report, the reason of for requesting consultation and the effect of the consultation on forensic report were investigated.

The data were analysed with SPSS program (version 22.0). Demographic data were expressed as mean value \pm standard deviation and/or percentage, comparison values were calculated at 95% confidence interval and $p < 0,05$ was considered as statistically significant.

The ethics protocol of the study was approved by S.B.Ü. Bozyaka Training and Research Hospital Clinical Researches Ethical Board (decision number: 01; approval date: 09/10/2019) and the study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Of the 72 cases examined in the study, 58 (80,6%) were male, while 14 (19,4%) were female. Mean age of the cases who were between the ages of 17 and 78 was found as 36,6 (st \pm :16.1) years. Consultation was requested in 27 (%37,5) battery and 25 (%34,7) traffic accidents. Demographic information of the cases is shown in Table 1. It was found that in 43 (58,9%) of the 72 cases included in the study, consultations were requested because of "contradiction between the imaging report and the remarks of the emergency physician or other clinical physician". Reasons for requesting consultation are shown in Table 2.

Table 1. Demographic data

	n	%
Gender		
Male	58	80,6
Female	14	19,4
Total	72	100,0
Number of reports by years		
2016	13	18,1
2017	16	22,2
2018	26	36,1
2019	17	23,6
Total	72	100,0
Type of event		
Battery	27	37,5
Traffic accident	25	34,7
Sharp object injury	14	19,4
Firearm injury	1	1,4
Falling down from height	3	4,2
Age determination	1	1,4
Burnt	1	1,4
Total	72	100,0

Table 2. Reasons for requesting radiology consultation		
	n	%
Contradiction between imaging report and clinical remark	43	59,7
Sharp object injury trace	13	8,2
Vertebral fracture subsidence percentage	4	5,6
Location of the bone in the fracture	4	5,6
Firearm injury trace	3	4,2
Distinction between old/new fracture	2	2,8
Bone age	2	2,8
Craniectomy percentage area	1	1,4
Total	72	100,0

Previous imaging reports of 21 (48%) of the 43 cases who received consultation as a result of contradiction were changed in accordance with the remarks of physicians of emergency service or other clinics. The data of the changes that occurred in imaging reports after the consultation requested from radiology department are shown in Figure 1.

When the effects of the 21 imaging reports that were changed on the forensic report issued were examined; it was found that the reports following judicial report were found to cause a change as "Not mild enough to be resolved with simple medical intervention (SMI)" in 13 cases (%61,9), while 5 (%23,8) were found to cause a change as "caused vital danger (VD)" (Table 3).

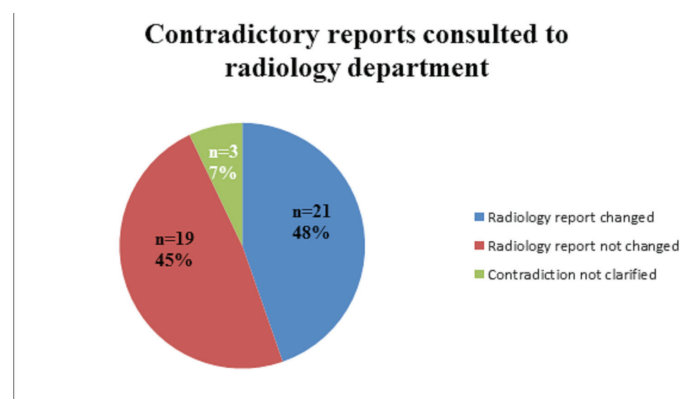


Figure 1. The final state of contradictory imaging reports after

Table 3. The effect of the change in imaging report after consultation on forensic report		
	n	%
*Changed to cannot be resolved with SMI from can be resolved	13	61,9
**Changed to VD from no VD	5	23,8
Changed to can be resolved with SMI from cannot be resolved		
Changed to no VD from VD	2	9,5
	1	4,8
Total	21	100,0

*SMI: Simple medical intervention **VD: Vital danger

It was found that no reports were issued to 3 cases (0,4%) since the contradiction was not solved despite radiology consultation and it was found that a recommended was made to ask for the opinion of Forensic Medicine Institute or university hospitals departments of forensic medicine.

DISCUSSION

It can be seen that there are few studies in our country which are similar to our study. In a study in which

a total of 371 consultations were requested to 333 cases, it was reported that consultation was requested from radiology department to clarify the suspicion of fracture/dislocation in 56,9%, to find out which bones had fracture/dislocation in 18%, to find out the localization of the fracture in the bone in 6,2%, to find out the type of fracture in 4,8%, to find out the degree of subsidence in the current fracture in 4%, to clarify whether the injury was suspicious internal organ injury

or injury to the abdomen/chest cavity in 21,3%, to solve the contradiction between imaging report and clinical diagnosis in 5,4%, to evaluate whether there was a causal link between trauma and the existing lesions in 2,1%, to evaluate the localization or nature of the foreign object in the body in 1,6% and to evaluate the degree of joint separation in 0,5% (7). Consultation has been defined as the physician's receiving the scientific information he/she needs outside of his/her field of specialization from physicians in other related specialities and as a result of scientific developments, it has become an indispensable part of today's medical practices (8). In forensic medicine practices, consultation is requested from the related branch for contradictory situations that need to be clarified in medical records during the process of forensic medical evaluation and report preparation.

In our country, the first evaluation of trauma cases is made by emergency service physicians. Depending on the type of trauma, consultation is requested from the related branches and the first evaluation of traumatic lesions is made by the emergency service physician or other clinical physicians (9). In the present study, it was found that previous imaging reports of 21 (48%) of these consultations were changed in accordance with the remarks of physicians of emergency service or other clinics after the radiology consultation. According to a study in which diagnostic errors in cases with multiple traumas were reported, it was stated that other injuries may be missed in case of determining the diagnosis which is the hospitalization indication in cases with multiple injuries (10). In a study conducted in our country in which diagnostic errors were examined in emergency service, it was reported that the most common type of errors that caused missed diagnoses were radiological errors and the most common radiological errors were caused by "misinterpretation of the clinician", "radiological imaging errors" and "delays in reporting" (11). In the present study, it was found that a significant part (58,9%) of the consultations requested from radiology department were requested due to "contradiction between imaging report and the remarks of emergency service physician or other clinical physician", which was in parallel with the literature.

In the present study, radiology department was consulted for vertebral subsidence percentage in 4 cases (5,6%), for the localization of the fracture in the bone in 4 cases (5,6%), and for the old/new distinction of the fracture in 2 cases (2,8%) and thus the fractures were detailed. After consultation, it was determined that the fractures were new fractures. The presence of bone fracture causes the injury to be not mild enough to be treated with SMI. In addition, the fracture's being linear, partial or open and the percentage of vertebral subsidence determines the extent to which the fracture affects vital functions (5,12,13). In the guide entitled "Evaluation of criminal injuries defined in TCC in terms of forensic medicine", "visceral injuries and injuries penetrating to body cavities (chest/abdominal cavity)" are defined as

"injuries causing VD" (5). In the present study, as a result of radiology consultations requested to find out injury trace, it was found that the injuries of 5 firearm and sharp object cases caused VD. Detection of bone fractures in the case exposed to trauma, the degree of impact of the fractures and the injury's causing VD change the result of the forensic report and thus influence the course of the investigation and trial (3).

In the present study, although consultation was requested from the radiology department, the contradiction in the injuries of 3 (0,4%) cases were not clarified and no forensic report was issued. In such cases, it may be beneficial to carry out medical evaluation by a higher authority that consists of more equipped and competent boards. In the present study, it was recommended to ask for opinion from Forensic Medicine Institute or university hospitals forensic medicine departments for the cases in which the contradiction was not clarified and it is thought that the evaluations made in boards established in such centres will contribute to the clarification of the contradiction.

In a study in which diagnostic errors in today's medical practices were examined, it was reported that missed diagnoses in trauma patients occurred in extremities the most and this was caused most frequently by physicians' focusing primarily on visceral organs and neglecting extremity traumas (14). In the present study, it can be seen that the changes in the imaging reports of 21 cases after consultation were reflected in the forensic report. After consultation, the reports of 13 cases were changed as "not mild enough to be resolved with SMI", the reports of 5 cases were changed as "caused VD", the reports of 2 cases were changed as "mild enough to be resolved with SMI" and the report of 1 case was changed as "did not cause VD". In a study conducted with Kavaklı, it was reported that 35,7% of the cases that were thought to be mild enough to be resolved with SMI were concluded not to be mild, 13,4% of the cases that were not thought to be mild enough to be resolved with SMI were concluded to be mild; 30,6% of the injuries that were thought to cause VD were concluded not to cause VD and 5,8% of the injuries that were thought not to cause VD were concluded to cause VD (7). The issues in forensic reports indicate the nature of the injury and the nature of the injury can cause changes in the course of investigation and in the amount of penalty to be given as a result of trial. When considered from this perspective, it can be seen that the consultations requested can influence forensic report preparation directly, while they can influence the investigation and trial indirectly.

CONCLUSION

The guide named "Evaluation of criminal injuries defined in TCC in terms of forensic medicine" is used in forensic medicine evaluation process and report preparation. In addition to evaluation criteria in these reports, judicial authorities can also ask forensic experts questions such as the trace of injury, bone fracture's being old/new,

bone age determination, craniectomy area, percentage of vertebral subsidence.

During the process of forensic report preparation, all medical examination and observation documents are evaluated together and the complaints stated in the anamnesis taken before examination are also taken into consideration. According to the evaluation made, new examinations and/or consultations are requested if needed and traumatic lesions that are likely to be missed are identified. In case of contradiction between imaging report and clinician, radiology consultation will contribute to making a healthier forensic evaluation and to issue the forensic report in the most correct way.

Conflict of Interest: *The authors declare that they have no competing interest*

Financial disclosures: *All authors report no financial interests or potential conflicts of interest.*

Ethics committee approval : *The ethics protocol of the study was approved by S.B.Ü. Bozyaka Training and Research Hospital Clinical Researches Ethical Board (decision number: 01; approval date: 09/10/2019) and the study was conducted in accordance with the Declaration of Helsinki.*

REFERENCES

1. Thakkalpi M. Reducing diagnostic errors in emergency department with the help of radiographers. *J Med Radiat Sci.* 2019;66:152-3.
2. Kim SJ, Lee SW, Hong YS, Kim DH. Radiological misinterpretations by emergency physicians in discharged minor trauma patients. *Emerg Med J.* 2011;29:635-9.
3. Türk Ceza Kanunu. Erişim adresi: <http://www.tbmm.gov.tr/kanunlar/k5237.html> Erişim tarihi: 01.07.2020.
4. Dokgöz H. Bilirkişilik. İçinde: Dokgöz H Editör, Adli Tıp & Adli Bilimler. Ankara: Akademişyen Kitabevi; 2019. s. 31-50.
5. Balcı Y, Çolak B, Gürpınar K, Anolay NN. Türk Ceza Kanunu'nda Tanımlanan Yaralama Suçlarının Adli Tıp Açısından Değerlendirilmesi Rehberi, 2019.
6. Mounts J, Clingenpeel J, McGuire E, Byers E, et al. Most frequently missed fractures in the emergency department. *Clinical Pediatrics* 2011;50(3):183-6.
7. Kavaklı U. Travmalı olgularda radyolojik tanının medikolegal değeri, tıpta uzmanlık tezi, İzmir, 2012.
8. Şener MT, Kök AN. Consultation in the practice of forensic medicine. *Bull Leg Med.* 2011;16(3): 77-80.
9. Taviloglu K, Ozdogan M. Current trends in trauma education and thoughts about emergency surgery in turkey. *Isr J Emerg Med.* 2008;8:15-9.
10. Stanescu L, Talner LB, Mann FA. Diagnostic errors in polytrauma: a structured review of the recent literature. *Emerg Radiol.* 2006;12:119-23.
11. Emet M, Saritas A, Acemoglu H, Aslan S, Cakir Z. Predictors of missed injuries in hospitalized trauma patients in the emergency department. *Eur J Trauma Emerg Surg.* 2010;36:559-66.
12. Akkaya H, Karbeyaz K, Gundogmus ÜN, Kara E, Ağırbaş A, Çağlar SA. Forensic medical importance of MRI in traumatic multivariate atypical vertebra fractures: 3 case reports. *J For Med.* 2012;26(3):196-202.
13. Toygar M, Şenol E, Can Ö. Burun kemik kırıklarının adli tıp açısından değerlendirilmesi. *J of Foren Med.* 2007;4:17-22.
14. Gore DC, Gregory SA. Historical perspective on medical errors: Richard Cabot and the institute of medicine. *J Am Coll Surg.* 2003;197(4):609-11.