ORIGINAL RESEARCH ORİJİNAL ARAŞTIRMA

DOI: 10.5336/forensic.2024-102011

Investigation of Deaths Due to Cut-Throat Injuries: A 10 Year Autopsy Study: Retrospective Research

Boğazlama Yaralanmalarına Bağlı Oluşan Ölümlerin Adli Tıbbi Yönden İncelenmesi: 10 Yıllık Otopsi Çalışması: Retrospektif Araştırma

Mehmet ASKAY[a], Talip VURAL[b], Hüseyin Çetin KETENCİ[a], Uğur REYHAN[c], Mustafa ERDOĞAN[d], Betül ACAR[a]

[a]Trabzon Forensic Medicine Institution Group Precidency, Trabzon, Türkiye
[b]Ministry of Justice Forensic Medicine Institution, İstanbul, Türkiye
[c]Denizli Forensic Medicine Branch Office, Denizli, Türkiye
[d]Trabzon Forensic Medicine Branch Office, Trabzon, Türkiye

This study was presented as an oral presentation at 3rd International 19th National Forensic Sciences Congress, November 3-6, 2022, Aydın, Türkiye.

ABSTRACT Objective: Cut-throat injuries are defined as injuries caused by cutting tools in the neck area. These types of injuries are an issue that needs to be emphasized due to high mortality rates. The most common origin for cut-throat injuries is homicide. Other causes include suicide and accidents. In this study, we aimed to emphasize the issues that need to be taken into consideration forensically in terms of findings that may contribute to the determination of the origin of cut-throat injuries cases. **Material and Methods:** Thirty one cases that died due to cut-throat injuries were included in this study. Information about the cases included in the study was obtained from our archive records and the National Judicial Network Project system. Data were recorded on Excel 2016 for Microsoft programme and the statistical analysis were done on SPSS 17.0 for Windows and the statistical alpha significance level were accepted as $p<0.05$. **Results:** The findings showed that 35.4% (n=11) of the cases were female, 64.5% (n=20) were male, and the mean age was 44 years (minimum: 13, maximum: 77). It was determined that 67.7% (n=21) of the deaths were due to homicide, 16.1% (n=5) were due to suicide, and 16.1% (n=5) were due to an accident. It was observed that 41.9% (n=13) of the great vessel injuries the neck were unilateral. **Conclusion:** Given the cut-throat injury-related death in our study, we think that necessary social, psychological and medical measures should be taken to improve survival, and this will provide great benefits in reducing mortality rates.

Keywords: Cut throat; homicide; suicide; hesitation marks; neck injuries

ÖZET Amaç: Boğazlamalar, kesici aletlerin boyun bölgesinde oluşturduğu yaralanma olarak tanımlanmaktadır. Bu tür yaralanmalar, yüksek mortalite oranları nedeniyle üzerinde durulması gereken bir konudur. Boğazlamalarda en yaygın köken cinayettir. Diğer sebepler arasında ise sıklıkla intihar ve kazalar gelmektedir. Bu çalışmamızda, kesici boğaz yaralanma vakalarının kökeninin belirlenmesine katkı sağlayabilecek bulgular açısından adli açıdan dikkat edilmesi gereken hususları vurgulamayı amaçladık. **Gereç ve Yöntemler:** Boğazlama nedeniyle ölen 31 olgu çalışmaya dâhil edildi. Çalışmaya dâhil edilen olgular hakkında bilgiler arşiv kayıtlarımızdan ve Ulusal Yargı Ağı Projesi sisteminden elde edildi. Veriler Microsoft programı için Excel 2016'ya kaydedildi ve istatistiksel analizler SPSS 17.0 for Windows programında yapıldı ve istatistiksel alfa anlamlılık düzeyi $p<0,05$ olarak kabul edildi. **Bulgular:** Olguların %35,4'ünün (n=11) kadın, %64,5'inin (n=20) erkek, yaş ortalamasının 44 yaş (minimum: 13, maksimum: 77 yaş) olduğu görüldü. Ölümlerin %67,7'sinin (n=21) cinayet, %16,1'inin (n=5) intihar, %16,1'inin (n=5) kaza orijiniyle oluştuğu tespit edildi. Boğazda meydana gelen ana damar yaralanmalarının %41,9'unun (n=13) tek taraflı olduğu görüldü. **Sonuç:** Çalışmada elde ettiğimiz boğazlama sonucu ölüm olgularının nedenleri dikkate alındığında, sağ kalımın artırılması için gerekli sosyal, psikolojik ve tıbbi altyapı tedbirlerinin alınması gerektiğini, bunun mortalite oranlarını azaltma yönünde büyük fayda sağlayacağını düşünmekteyiz.

Anahtar Kelimeler: Boğazlama; cinayet; intihar; tereddüt kesileri; boyun yaralanması

Correspondence: Talip VURAL
Ministry of Justice Forensic Medicine Institution, İstanbul, Türkiye
E-mail: tlpvrl25@gmail.com

Peer review under responsibility of Turkiye Klinikleri Journal of Forensic Medicine and Forensic Sciences.

Received: 06 Feb 2024 ***Received in revised form:*** 21 Feb 2024 ***Accepted:*** 26 Feb 2024 ***Available online:*** 28 Feb 2024

In general, the injuries caused by cutting tools have a relatively low fatality rate; however, they become lethal if the great vessels of an extremity or neck are cut. Cut-throat injuries are defined as injuries caused by cutting tools in the neck area. These types of injuries are an issue that needs to be emphasized due to high mortality rate.[1-3]

The neck area has a very complex anatomical structure. Injuries to the respiratory tract, esophagus, vascular nerve structures and endocrine organs frequently occur in cutting injuries in this narrow anatomical region. In cut-throat injuries, the main causes of death are bleeding due to injury to great cervical arteries and veins, asphyxia due to aspiration of blood into the trachea if the trachea is cut, and air embolism due to inflow of air into the cut veins (Figure 1). The most common origin for cut-throat injuries is homicide. Other causes include suicide and accidents.[1]

This study aimed to reveal the guiding findings by evaluating the demographic characteristics of the victims, origin, crime scene findings, anatomical structures injured in the neck and injury characteristics of deaths resulting from cut-throat injuries, which have a high mortality rate.

In this study, we aimed to emphasize the issues that need to be taken into consideration forensically in terms of findings that may contribute to the determination of the origin of cut-throat injuries cases.

MATERIAL AND METHODS

The files of 6,987 cases autopsied between 2011 and 2021 at the Forensic Medicine Institute, were retrospectively reviewed. A total of 179 cases that died due to stab wounds were accepted as the population of the study. Among 179 cases, 31 cases that died due to cut-throat injuries (2.5% of total deaths, 17.0% of deaths due to stab wounds) were included in the study. Information about the cases included in the study was obtained from our archive records and the National Judicial Network Project system. The cases were evaluated regarding origin, injury types, demographic characteristics, accompanying lesions and scene characteristics. The proportional differences between the anatomical structures injured in the neck according to the origin were investigated using the chi-square test. Since the expected value was fewer than 5 in more than 20.0% of the cells, the test results were evaluated according to the exact p-values. Data were recorded on Excel 2016 for Microsoft programme and the statistical analysis were done on SPSS 17.0 for Windows and the statistical alpha significance level were accepted as $p<0.05$.

The study was carried out with the approval of Forensic Medicine Institute Presidency Education and Scientific Research Commission, dated March 30, 2021 and protocol number 21589509/2021/312.

FIGURE 1: Tracheal cut and air embolism due to this injury.

RESULTS

The findings showed that 64.5% (n=20) were male, 35.4% (n=11) of the cases were female and the mean age was 44 years (minimum: 13, maximum: 77). It was determined that 16.1% (n=5) were due to suicide, 16.1% (n=5) were due to an accident and 67.7% (n=21) of the deaths were due to homicide. It was determined that 71.0% (n=22) of the incidents happened indoors [51.6% (n=16) at home, 6.4% (n=2) in the office, 6.4% (n=2) in prison, 3.2% (n=1) at school, 3.2% (n=1) in a hotel room], and 29.0% (n=9) occurred in open areas, such as roadside, woodland and seaside.

Given the causes of murder-origin incidents, the origin was domestic violence in 38% (n=8), financial dispute in 19.0% (n=7), robbery in 9.5% (n=4), sexual violence in 4.7% (n=1), a mental disorder in 4.7% (n=1), a terrorist attack in 4.7% (n=1), and an unknown reason in 9.5% (n=4).

When the perpetrators of murder-origin cut-throat injury cases were analyzed, the findings showed that 33.0% (n=7) were husbands, 29.0% (n=6) were boyfriends, 10.0% (n=2) were brothers, 10.0% (n=2) were male relatives, 5.0% (n=1) were sons, and 4.0% (n=4) were foreign people. It was observed that 60.0% (n=3) of the suicide-origin incidents occurred based on a depressive disorder, 20.0% (n=1) occurred on the basis of substance abuse, and 20.0% (n=1) occurred based on an organic disorder (frontal lobe syndrome). Given the accident-origin incidents, it was determined that 60.0% (n=3) were due to work accidents and 40.0% (n=2) were due to traffic accidents.

It was observed that 38.7% (n=12) of the cervical great vessel injuries were bilateral and 41.9% (n=13) were unilateral. Fisher's exact test results showed no difference between the rates of major vessel injuries in deaths (unilateral-bilateral) according to origin (χ^2=3.503, p=0.524). Examination of the injured anatomical structures in the neck showed right carotid artery injury in 38.7% (n=12), left carotid artery injury in 41.9% (n=13), injury of right jugular veins in 51.6% (n=16), injury of left jugular veins in 51.0% (n=16), tracheal injury in 41.9% (n=13), esophageal injury in 19.3% (n=6), laryngeal injury in 35.4% (n=11), spinal cord injury in 16.1% (n=5), and the cervical vertebral injury in 48.3% (n=15) of the cases. Fisher's exact test showed no difference between the ratios of injured structures in relation to the origin (χ^2=19.309, p=0.253). Vertebra injury was observed in 57.1% (n=12) of the homicide cases (Table 1). Fisher's exact test showed that there was a significant difference between homicide and suicide cases in terms of vertebra injury (p=0.042).

The characteristics of the neck and non-neck injuries by origin are shown in Table 1. When the lo-

TABLE 1: Injuries by origin.

	Homicide		Suicide		Accident		Total		χ^2	p value
	n	%	n	%	n	%	n	%		
Main vascular cuttings										
Unidirectional	8	38	1	20	4	80	13	41.9		
Bidirectional	8	38	3	60	1	20	12	38.7	3.503	0.524
None	5	23.8	1	20	0	6	19.3			
Structures cut in the neck										
Right A. Carotis com.	9/21	42.8	0		3/5	60	12/31	38.7		
Left A. Carotis com.	11/21	52.3	0		2/5	40	13/31	41.9		
Right V. Jugularis Ext-Int.	9/21	42.8	3/5	60	4/5	80	16/31	51.6		
Left V. Jugularis Ext-Int	12/21	57.1	2/5	40	2/5	40	16/31	51.6		
Trachea	10/21	47.6	0		3/5	60	13/31	41.9	19.309	0.253
Esophagus	4/21	19	0		2/5	40	6/31	19.3		
Larynx	10/21	47.6	4/5	80	1/5	20	11/31	35.4		
Medulla spinalis	3/21	14.2	0		2/5	40	5/31	16.1		
Notches on the vertebrae	12/21	57.1	0		3/5	60	15/31	48.3		

calizations of neck injuries were analyzed, the findings showed that 77.4% (n=24) of the injuries were in zone 2, 16.1% (n=5) were in zone 1, and 6.4% (n=2) were in zone 3. All suicide cases (n=5) had hesitation incisions.

It was observed that 80.7% (n=17) of the homicide cases, 80.0% (n=4) of the suicide cases, and 60.0% (n=3) of the accident cases had additional injuries in regions other than the neck. When the types of additional injuries seen in other parts of the body were examined, it was determined that 70.0% (n=17) were sharp object injuries, 33.0% (n=8) were blunt traumatic injuries, 16.0% (n=4) were abrasions, and 4.1% (n=1) were burns.

DISCUSSON

The incised wounds neck injury was observed in 31 (17.0%) of 179 patients who died due to a sharp object trauma. The neck is protected by the vertebrae posteriorly, by the head superiorly, and by the thorax inferiorly, and its anterior (larynx and trachea) and lateral regions are the most vulnerable to trauma. Therefore, incised wounds neck injuries are a common type of injury among all traumas.[4] Given that cut-throat injuries have a higher mortality risk compared to other sharp object/stab wounds, and the neck is preferred in actions made with an intend to kill, such as homicide and suicide, a higher proportion of incised wounds neck injuries, was significant.

The findings showed that 35.4% of the cases were female, 64.5% were male, and the mean age was 44 years. When similar studies were examined, it was seen that deaths caused by cut-throat injuries were more frequent in the male gender and the adult age group. Given the dominance of men in social life and the fact that the 3-4th decades constitute the most active ages, we think that our results are meaningful.[5,6]

It was determined that 67.7% of the deaths were due to homicide. Similar results have been reported in the literature regarding origin. In a study by Akber et al, in which cut-throat injury cases were handled, 85.84% of the deaths were due to homicide. In the study of Acharya et al., 60.0% of the cut-throat injury incidents occurred due to homicide, followed by suicide.[7,8]

It was determined that 71.0% of the incidents happened indoors (at home, in the office, in prison, at school, in a hotel room). In the study of Ozdemir et al., 73.3% of cut-throat injuries were reported to take place in indoors.[9] We suppose that indoors are preferred because they are out of sight and more sheltered from the factors that would prevent the event from occurring.

Considering the causes of murder-origin incidents, the origin was domestic violence in 38.0%. When the closeness of the perpetrators with the victim was analyzed, 33.0% were husbands. Studies have shown that mental disorders, domestic violence, terrorism and financial problems are the factors for homicide at varying rates.[9,10]

Literature data indicate that most of the victims were in close relationships with the perpetrators. It is evident that the murder-origin events are usually caused by the motives of marital conflicts, jealousy and honor. In patriarchal traditions, honor, as a rule, requires sexual abstinence. Accordingly, the woman has to protect the pudicity, name and honor of her father, son, brother, and particularly of her husband. In cases where the woman does not fulfill these requirements, moral values foresee the cleansing of honor with blood.[9-11] We believe that factors, such as the role of the head of the family attributed to the male gender, taking over the family's livelihood, protecting the social reputation and understanding of honor in the patriarchal traditions in our country, explain the male dominance seen in the perpetrators.

It was observed that 60.0% of the suicide-origin incidents occurred based on a depressive disorder, 20.0% occurred on the basis of substance abuse, and 20.0% occurred on the basis of an organic disorder (frontal lobe syndrome). In the literature, the main causes of suicide have been reported as unemployment, drug addiction and psychiatric disorders.[6-10,12] Some mental disorders underlying suicides are of organic in origin. In the autopsy of a case in the study group who committed suicide by cutting his/her throat, significant volume loss and malformation were observed in the left frontal lobe's orbitofrontal area (Figure 2). When this malformation was evaluated together with the medical history of the individ-

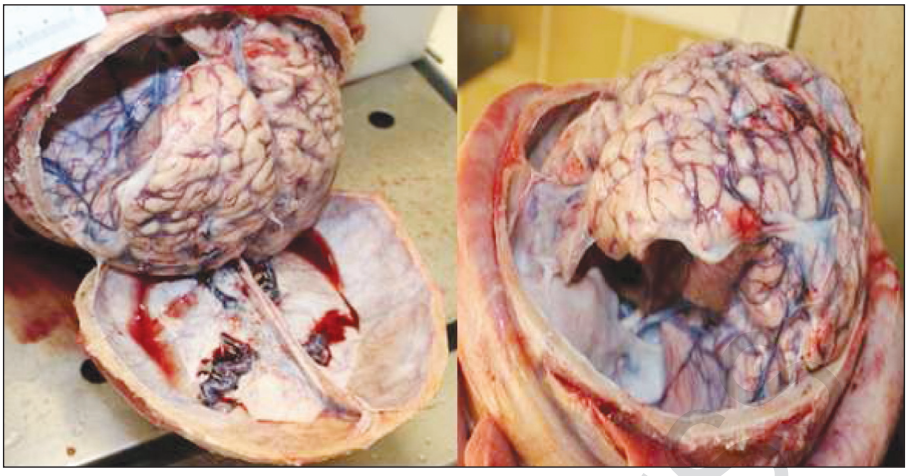

FIGURE 2: Left orbitofrontal volume loss in the brain of a case who committed suicide by cutting the throat.

ual, the current clinical picture was compatible with frontal lobe syndrome, which manifests itself with self-harming, personality disorder and aggressive behaviors.

Accidental injuries may occur due to heavy equipment, glass, or any sharp objects.[8,13] When the accidents were examined in the study, it was seen that two cases were injured in traffic accidents and three cases were injured by a chainsaw. We believe that the amateur use of cutting tools, such as electric motors used in gardening, due to the geographical features of the working area increases the dangers of work accidents.

It is of importance whether the wounds are caused by accident, homicide or other reasons. Since the investigation of the crime scene will make important contributions to illuminating the origin of the incident, a detailed crime scene investigation should be performed before the autopsy, including the deceased's medical history, lifestyle, and all the possibilities that indicate homicide or suicide. Inquiring about his/her relatives, past information, such as suicide attempts, history of depression, marriage, social or financial problems, may provide important information that will clarify the event. Many unanswered questions will remain unless the crime scene is carefully evaluated. A suicide note may be found at the place of the crime. Although it is not a definite finding, the blood flowing from the cut in the throat collects in the front of the body in suicides; however, the blood coming from the cut flows to the sides of the neck and the back in homicides since the victim is usually made lay on the ground (Figure 3).[14-16]

In cut-throat injury cases, the wound's morphological characteristics (length, depth, direction, vitality) as well as crime scene conditions have important roles in determining the origin. In suicide, the stab wound that causes death is typically accompanied by superficial cuts, called hesitation wounds, neighboring the first blow (Figure 4). The presence of blood in the limited area around the corpse and the absence of fighting or struggle signs in the area also suggest suicide.[1,16]

Homicide should be considered primarily in the differential diagnosis in cases of death caused by sharp object/stab wounds. Homicide usually involves a single deep cut. Cervical arteries and veins, trachea and esophagus may be cut off, and the depth of the incision may have gone down to the cervical vertebrae (Figure 5). Frequently there are other signs of struggle in the person's body.[9,17]

In our study, 41.9% of the great vessel injuries in the neck were unilateral. Fisher's exact test results showed no difference between the rates of major vessel injuries in deaths (unilateral-bilateral) in relation to the origin. The determination of the origin, by taking the unilateral or bilateral injury into account may cause errors in deaths due to cutting throat.[9] Although

FIGURE 3: A case of suicide by cutting the throat.

FIGURE 4: Hesitation wounds.

it is thought that there will be a one-sided injury in suicides, it is seen that bilateral injury may occur with the severity of the psychiatric disorder, as in our study.

Examination of the injured anatomical structures in the neck showed injury of right jugular veins in 51.6% of the cases. In a study of 74 cases in which Rao investigated cut-throat injuries, it was revealed that the trachea, carotid arteries, and jugular veins were affected in 91.6% of the cut-throat cases, and the esophagus was affected in 18.9%.[18] It is expected that the structures located anteriorly in the neck are affected more frequently owing to their anatomical localizations. It has been shown that bone damage usually occurs in homicide cases due to the high energy requirement, whereas in suicide cases, the injury is usually limited to soft tissues (Figure 5).[19] The injury characteristic-origin relationship of the anatomical structures in the neck detected in our study is in accordance with the literature. When the localizations of neck injuries are analyzed in our study, 77.4% of the injuries were in zone 2.

The neck is anatomically divided into 3 regions based on the incised wounds neck injuries, mortality rate, and treatment approach. When the literature is reviewed, it is noticed that zone 2 has been reported to be the most affected area, zone 3 has been the least affected area in cut-throat injuries, and zone 1 has had the highest mortality rate due to vascular injury and surgical risks.[20]

In our study, it was observed that 80.7% of the homicide cases had additional injuries in regions other than the neck. When the types of additional injuries seen in other parts of the body were examined,

FIGURE 5: Homicides by cutting the throat. Deep injury down to cervical vertebrae and decapitation.

it was determined that 70.0% were sharp object injuries. The most common accompanying injuries are sharp object injuries in cut-throat cases. A wide variety of additional findings can be found, such as hesitancy cuts on the neck, chest and extremities in suicide cases, defense cuts and non-lethal cuts on other parts of the body in homicide cases, blunt traumatic injuries, gunshot wounds, or carbonized burns caused by burning the body to prevent the event from being illuminated.[18] In case of the efforts to cover up the event, such as cremation, decomposition and burial, a careful examination of the changes in the neck vertebrae due to the cut will be of great benefit in elucidating the origin of the death event.

CONCLUSION

Our study showed that the most common cause of cut-throat injuries is homicide, and autopsy findings are as important as crime scene investigation in determining the origin. As a preventive measure, appropriate social and psychological assistance for the common causes of homicide and suicide will be of substantial benefit in reducing mortality.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Mehmet Askay, Hüseyin Çetin Ketenci, Uğur Reyhan;* ***Design:*** *Mehmet Askay, Talip Vural, Mustafa Erdoğan;* ***Control/Supervision:*** *Hüseyin Çetin Ketenci, Talip Vural, Betül Acar;* ***Data Collection and/or Processing:*** *Mehmet Askay, Uğur Reyhan, Mustafa Erdoğan;* ***Analysis and/or Interpretation:*** *Hüseyin Çetin Ketenci, Talip Vural, Mehmet Askay;* ***Literature Review:*** *Talip Vural, Mehmet Askay, Mustafa Erdoğan;* ***Writing the Article:*** *Mehmet Askay, Talip Vural;* ***Critical Review:*** *Hüseyin Çetin Ketenci, Uğur Reyhan, Mehmet Askay, Betül Acar.*

REFERENCES

1. Knight B, Saukko PJ. The pathology of wounds. Knight's Forensic Pathology. 4th ed. Boca: Taylor &Francis Group LCC Press; 2016. p.229-38.
2. 2-Madea B, Pollak S, Thierauf A, Meissner C, Oehmichen M, Leth PM. Mechanical trauma and clasification of wounds. In: Madea B, ed. Handbook of Forensic Medicine. 1st ed. Hoboken, N.J: Wiley Blackwell Bonn; 2014. p.253-327.
3. Aksoy E, Çoltu A, Ege B, Günaydin G, İnanıcı MA, Karali H. Adli Travmatoloji. [Erişim tarihi: 29 Eylül 2020]. Erişim linki: https://www.ttb.org.tr/eweb/adli/4.html
4. Maroon JC, Bost JW, Petraglia AL, Lepere DB, Norwig J, Amann C, et al. Outcomes after anterior cervical discectomy and fusion in professional athletes. Neurosurgery. 2013;73(1):103-12; discussion 112. PMID: 23615099.
5. Tuljapure A. Cut throat injuries- review of 41 cases at a tertiary referral hospital. IJBAMR. 2018;8(1):477-89. Kaynağa direkt erişim sağlanabilecek link bilgisi eklenmelidir.
6. Akber EB, Zaman PD, Jahan I, Mahmud SH. Cut throat injuries-a forensic study. Mainamoti Med. Coll. J. 2018;1(1):21-6. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://www.mmmch.edu.bd/pdf/mmmc_journal_2018.pdf
7. Akber EB, Nowshin I, Jahan I. Forensic profiling of cut throat wounds. Mymensingh Med J. 2021;30(1):106-10. PMID: 33397859.
8. Acharya S, Dash RK, Das A, Hota M, Mohapatra C, Dash S. An epidemiological study of cut throat injury during COVID-19 pandemic in a tertiary care centre. Indian J Otolaryngol Head Neck Surg. 2022;74(Suppl 2):2764-9. PMID: 33134155; PMCID: PMC7584311.
9. Ozdemir B, Celbis O, Kaya A. Cut throat injuries and honor killings: review of 15 cases in eastern Turkey. J Forensic Leg Med. 2013;20(4):198-203. PMID: 23622458.
10. Karthik SK, Jayaprakash G, Nagaraj BM, Manjunath KH. Autopsy study of homicidal cut throat injuries. J Karnataka Medicolegal Society. 2018;27(1):21-4. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://kamls.in/wp-content/uploads/2016/11/vol-27-part-1-21-24.pdf
11. Altunel M. Namus [Honor]. Ankara Barosu Dergisi. 2012;1:215-17. https://dergipark.org.tr/tr/pub/abd/issue/33796/374276
12. Gupta D, Shah C, Jain V, Ganvit N. Cut throat injury: a tertiary care centre experience. Bengal J. Otolaryngol. Head Neck Surg. 2021;29(1):60-5. https://bjohns.in/journal3/index.php/bjohns/article/view/381/308
13. Bilgen S, Türkmen N, Eren B, Fedakar R. Peripheral vascular injury-related deaths. Ulus Travma Acil Cerrahi Derg. 2009;15(4):357-61. PMID: 19669965.
14. Gülbeyaz H, Esen Melez İ, Melez DO, Üzün İ. Evaluation of manner of death determination parameters in deaths related to sharp force injury. J For Med. 2017;31(1):6-16. https://www.researchgate.net/publication/313226863_Evaluation_of_Manner_of_Death_Determination_Parameters_in_Deaths_Related_to_Sharp_Force_Injury

15. Karbeyaz K, Akkaya H, Balci Y, Urazel B. Analysis of suicide notes: An experience in Eskişehir city. Noro Psikiyatr Ars. 2014;51(3):275-9. PMID: 28360638; PMCID: PMC5353135.

16. Ventura F, Bonsignore A, Gallo M, Portunato F, De Stefano F. A fatal case of suicidal stabbing and cutting. J Forensic Leg Med. 2010;17(3):120-2. PMID: 20211449.

17. Yadav A, Raheel MS, Kumar R L, Sharma SK, Kanwar H. Cut-throat wounds: Suicidal and homicidal-two case reports and review of literature. Med Sci Law. 2016;56(1):53-7. PMID: 26101442.

18. Rao D. An autopsy study of 74 cases of cut throat injuries. Egypt. J. Forensic Sc. 2015;5(4):144-9. https://www.sciencedirect.com/science/article/pii/S2090536X14000781

19. Brunel C, Fermanian C, Durigon M, de la Grandmaison GL. Homicidal and suicidal sharp force fatalities: autopsy parameters in relation to the manner of death. Forensic Sci Int. 2010;198(1-3):150-4. PMID: 20219299.

20. Hundersmarck D, Reinders Folmer E, de Borst GJ, Leenen LPH, Vriens PWHE, Hietbrink F. Penetrating neck injury in two dutch level 1 trauma centres: the non-existent problem. Eur J Vasc Endovasc Surg. 2019;58(3):455-62. PMID: 31307866.