Naif Arab University for Security Sciences
Arab Journal of Forensic Sciences and Forensic Medicine
المجلة العربية لعلوم الأدلة الجنائية والطب الشرعي
https://journals.nauss.edu.sa/index.php/AJFSFM

Characteristics of Homicidal Cut-Throat Death Cases

مواصفات حالات وفيات ذبح العنق الجنائية

Hasan A. Abder-Rahman[1], Imad M. Al-Abdallat[1], Lamia Alsenaidi[1*], Mahmoud Zregat[2], Almotazbellah Abualeme[2], Huthaifa Ababneh[3], Abdel-Rahman Al Husni[3], Abed-Alraheem Ali[3]

[1]Pathology, Microbiology, and Forensic Medicine Department, School of Medicine, University of Jordan, Amman, Jordan.

[2]National Institute of Forensic Medicine, Ministry of Health, Amman, Jordan.

[3]School of Medicine, University of Jordan, Amman, Jordan.

Received 02 July 2024; Accepted 27 Oct. 2024; Available Online 24 Dec. 2024.

Abstract

Cut-throat cases are rare, posing significant challenges for forensic pathologists in determining the manner of death. This study aims to identify key findings that can assist in determining the origin of homicidal intent based on crime scene investigations, the number of wounds, and their characteristics. We conducted a retrospective analysis of 20 cases of homicidal cut-throat injuries in Northern Amman. Detailed examinations of demographic data, toxicological results, neck injuries, other body injuries, and personal motives were performed. The fatal neck wounds were classified by depth into three grades and by location into three levels (upper, middle, lower). The relationships between the level and grade of neck wounds, superficial neck wounds, and other body injuries revealed several patterns distinguishing homicidal cut-throat injuries. This study enhances understanding of the patterns and characteristics associated with homicidal cut-throat injuries, providing valuable insights for forensic investigations.

Keywords: Forensic sciences, sharp force injury, hesitation marks, deep neck incision, superficial neck incision, wound analysis.

المستخلص

تعتبر حالات قطع الحلق نادرة، مما يشكل تحديات كبيرة لأطباء الطب الشرعي في تحديد طريقة الوفاة. يهدف هذا البحث إلى تحديد النتائج الرئيسية التي يمكن أن تساعد في تحديد أصل النية الإجرامية بناءً على تحقيقات مسرح الجريمة، وعدد الجروح وخصائصها. قمنا بتحليل استعاد لـ 20 حالة إصابة بقطع الحلق الجنائي في شمال عمان. تم إجراء فحص تفصيلي للبيانات الديموغرافية، والنتائج السمية، وإصابات الرقبة، والإصابات الأخرى في الجسم، والدوافع الشخصية. تم تصنيف الجروح القاتلة في الرقبة بناءً على العمق إلى ثلاث درجات، وبناءً على الموقع إلى ثلاثة مستويات (علوي، أوسط، وسفلي). كشفت العلاقات بين مستوى ودرجة الجروح العميقة في الرقبة، والجروح السطحية، والإصابات الأخرى في الجسم عن عدة أنماط تميز إصابات قطع الحلق الجنائية. يعزز هذا البحث الفهم حول أنماط وخصائص إصابات قطع الحلق الجنائية، مما يوفر رؤى قيمة للتحقيقات الجنائية.

الكلمات المفتاحية: علوم الأدلة الجنائية، إصابة بأداة حادة، علامات تردد، جرح عميق بالرقبة، جرح سطحي بالرقبة، تحليل الجروح.

Production and hosting by NAUSS

* Corresponding Author: Lamia Alsenaidi
Email: lamia.alsenaidi@gmail.com

doi: 10.26735/RDVW4510

1. Introduction

Cut-throat injuries represent a unique and severe form of trauma that is potentially devastating and associated with substantial emotional and physical burdens on the community and hospital resources [1]. Globally, such injuries account for approximately 5% to 10% of all traumatic fatalities, with varying prevalence across regions depending on socio-economic and cultural factors [2]. Although these cases are relatively rare, their impact is considerable, requiring extensive medical and forensic resources. In Jordan, cut-throat injuries are infrequent but present a substantial challenge for forensic pathologists in determining the cause and manner of death.

The neck is an extremely vital area of the body that is sensitive to external trauma, with the presence of essential blood vessels, nerves, and the trachea, as any substantial damage to these structures might be deadly to the person on the receiving end. This unique and peculiar cause of death in forensic medicine is typically seen as a deliberate attempt to end someone's life by cutting their throat, which can sever major blood vessels and inflict fatal injuries. The severity of the cut wounds is often associated with the victim's age and the presence of additional fatal injuries. Therefore, it is essential to examine and evaluate the fatal injuries and other factors associated with the pattern such as the direction of injury, underlying damages, the level of neck affected, and the causes that lead to death. It is also important not to neglect other injuries located in different areas of the body to have a more cohesive and specific knowledge of each unique case. Furthermore, it is immensely important to take into consideration the perpetrator’s motive and the reason he chose to carry out the crime in such a brutal and barbarous manner.

This study focuses on identifying the key features of homicidal cut-throat injuries, aiming to provide forensic pathologists with critical insights that can aid in distinguishing the manner of death.

2. Materials and Methods

In this retrospective study, we reviewed the medicolegal reports of 20 homicidal cut-throat injury cases that occurred between 2009 and 2021. These cases were handled by the forensic department at Jordan University Hospital and the National Institute of Forensic Medicine in Northern Amman, covering a population of 1 million. All autopsies were conducted by board-certified forensic pathologists, including external forensic examinations and complete dissections of the head, neck, and thoracoabdominal cavities. Ethical approval for the study was granted by the Institutional Review Board (IRB) of Jordan University Hospital (JUH), University of Jordan, Approval number 222000167, dated March 29, 2022. The study complied with Good Clinical Practice (GCP), the Declaration of Helsinki, and the International Council for Harmonization (ICH) guidelines.

Out of 25 reviewed cases, 20 met the inclusion criteria, which required at least one successful fatal incised neck wound. The following data were collected and analyzed by our research team: the victim’s sex, age, crime scene, and the relationship to the culprit (when available). Toxicology reports were reviewed for each case, alongside a detailed assessment of the number and types of neck wounds and other body injuries. Neck wounds were categorized into three levels based on location; upper level (above larynx), middle level (at the level of the larynx), and lower level (at the level of the trachea). And graded by depth: Grade 1 (only vessels were injured), Grade 2 (vessels and respiratory tract were injured), and Grade 3 (cut

reached the vertebral tract). Data were processed and analyzed using Microsoft Excel, with tables created in both Microsoft Excel and Microsoft Word.

3. Results

The 20 cases were grouped into three groups according to the depth of the primary cut wound in the neck, and the information gathered from these cases was divided into two tables. Table 1 shows demographic information, the circumstances of death, and neck injuries. Table 2 shows all body injuries.

3.1. Demographics

Both males and females were involved, with 11 of the 20 cases being male. 15 out of 20 cases, or 75%, involved people under the age of 50. The majority of the cases (9 cases) were in the 4th and 5th decades (30-49 years old). Four cases involved individuals aged 7 or younger. In seven adult cases, the marital status was known: 3 married, 2 single, and 2 divorced. In 7 cases, the perpetrator was known (35%), and in 5 of those cases (71.4%), the killer was a close relative. 14 out of the 20 cases (70%) occurred at the victim's home.

3. 2. Toxicology

Toxicology screening was performed in 11 cases; of these, 6 tested positive (54.5% were male), generally for drugs including CNS stimulants, depressants, or alcohol.

3. 3. Neck Incised Wounds

15 out of 20 cases (75%) had multiple incised wounds in the neck, ranging from 2 to 10. The depth of the wounds varied, with some being superficial (affecting only the skin) and others being deep enough to affect the respiratory tract, blood vessels, or even the bone.

3.3.1. Deep Cut Wounds

Deep cut wounds were typically solitary (12 out of 20 cases, or 60%), although in 8 of the cases (40%), there were between 2 to 8 deep wounds. In 8 cases (40%), the major arteries were severed (Grade 1), while the upper respiratory tract was affected in 4 cases (20%, Grade 2), and in 8 cases (40%), the cuts reached the bone (Grade 3). Grade 3 wounds were generally observed in males (7 out of 8 cases), while females had more Grade 1 and 2 wounds (8 out of 12 cases). Deep cuts in people over the age of 45 were more frequently Grade 3 (5 out of 8 cases), while wounds in younger victims were more commonly Grade 1 and 2 (8 out of 12 cases). The direction of the deep incised wounds was clarified in 16 cases (80%). In 11 of these cases (68.8%), the cuts were from left to right, with the deeper part on the left side and the superficial end (tailing) on the right side. In 5 cases (31.3%), the cuts went from right to left, with the deeper part on the right side and the superficial end on the left side. Oblique wounds were observed in 9 out of 16 cases (56.3%). The main cut wound was in the upper level in 5/20 cases (25%), middle level in 9/20 cases (45%), and lower level in 6/20 cases (30%). Grade 2 cut wounds were all in the lower level 4/4 cases, while grade 3 wounds were in the middle level in 5/8 cases.

3.3.2. Superficial Cut Wounds

One or more superficial wounds accompanied the deep wounds in 10 cases (50%). In three cases, the superficial wounds ran parallel to the deep wounds. 40% of the cases had one superficial wound, while 60% had between 2 and 6 superficial wounds. The superficial wounds present in all cases at the lower level (6/6) 100%, with none found in the upper level (0/5) 0%. The majority of females 6/9 have superficial wounds (66.7%), while it is mostly

Table 1- Demographic data and circumstances of death & neck injuries

Depth*	#	Gender/Age/ Social status	Murderer info	Crime location	Toxicology	Neck incised wound					Others
						Superficial incised wound in neck	Deep incised wound	Total Incise wound in neck	Level** of main cut wound	Direction	
Grade 1	1	F/39/Divorced	Unavailable	outdoor	Not done	absent	3 (2 parallel)	3	upper	LT to RT oblique	—
	2	F/45/married	Unavailable	indoor	Not done	absent	8 crossed	8	upper	LT to RT Slightly oblique	—
	3	M/46/unknown	Unavailable	Indoor	Not done	absent	1	1	upper	LT to RT oblique	—
	4	F/newborn/single	unavailable	outdoor	negative	absent	1	1	middle	RT to LT	
	5	F/23/divorced	Unavailable	indoor	Not done	4	1	5	middle	LT to RT oblique	Pregnant in 4 months
	6	M/35/single	Brother	indoor	cannabinol cannabidiol dronabinol Amphetamine paracetamol Benadryl	6 crossed	4 parallel	10	middle	LT to RT oblique	—
	7	M/37/unknown	Unavailable	Indoor	Tramadol Venlafaxine	absent	1	1	middle	Lt to RT Oblique up to down	—
	8	F/Neonate/single	Unavailable	outdoor	Not done	1	4 parallel	5	lower	RT to LT oblique	—
Grade 2	9	M/40/unknown	Unavailable	Indoor	Amphetamine Alcohol	1	1	2	lower	Lt to Rt oblique	—
	10	F/42/unknown	Relative (son)	indoor	Alcohol	3 parallel	2 parallel	6	lower	LT to RT oblique	—
	11	F/61/unknown	Relative (son)	indoor	Negative	1 parallel to the deep	1	2	lower	LT to Rt Post to Ant	The killer is addict
	12	F/50/married	unavailable	indoor	Not done	4	1	5	lower	Lt to Rt	—

Table 1 Continued

Depth*	#	Gender/Age/ Social status	Murderer info	Crime location	Toxicology	Neck incised wound					Others
						Superficial incised wound in neck	Deep incised wound	Total Incise wound in neck	Level** of main cut wound	Direction	
Grade 3	**13**	M/3/single	Father	indoor	Not done	absent	1	1	upper	unknown	—
	14	M/26/single	Unavailable	outdoor	Theophylline	absent	2 parallel	2	upper	RT to LT	—
	15	M/7/single	stranger	Indoor	Negative	4 posterior of neck	1 anterior	5	middle	unknown	Sexual assault
	16	M/48/unknown	stranger	Outdoor	Not done	absent	2	2	middle	RT to LT	—
	17	F/57/unknown	Relative spouse	indoor	Negative	1	1	2	middle	unknown	—
	18	M/60/unknown	Unavailable	indoor	Not done	absent	1	1	middle	RT to LT	—
	19	M/84/Married	Unavailable	outdoor	Negative	absent	3 parallel	3	middle	LT to RT transverse	—
	20	M/45/unknown	unavailable	indoor	amphetamine	2 parallel	1 anterior	3	lower	unknown transverse	—

*Depth of main incise wound: Grade 1: vessels injured only, Grade 2: respiratory tract injury, Grade 3: to the bone of vertebral column.

**upper level: above larynx , middle level: at the the larynx , lower level: at the trachea.

Table 2 - Total body injuries according to depth of main fatal cut throat wound

Depth	#	Neck						Head						Trunk						Extremities						total	level	Additional autopsy findings
		*C	A	L	F	S	I	C	A	L	F	S	I	C	A	L	F	S	I	C	A	L	F	S	I			
Grade 1	1	-	-	-	-	4	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	2	12	upper	Cut in diaphragm
	2	-	-	-	-	3	8	-	-	-	-	1	2	-	-	-	-	17	-	-	-	-	-	2	2	35	upper	Cut in heart, liver, RT lung cardiac tamponade, pleural and peritoneal hemorrhage
	3	-	-	-	-	6	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	8	middle	
	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	middle	
	5	-	-	-	-	3	5	-	4	-	-	1	-	-	-	-	-	5	-	-	6	-	-	2	1	27	middle	Cut in LT lung, pleural hemorrhage
	6	1	1	-	-	2	10	12	2	3	-	-	-	-	-	-	-	2	2	-	-	-	-	1	6	42	middle	
	7	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	2	7	lower	
	8	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	upper	
avg			0.3		0	2.3	4.3		2.6		0	0.3	0.3		0.1		0	3.3	0.3		1.3		0	0.8	1.6	17		
Grade 2	9	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	lower	
	10	-	-	-	-	-	6	1	-	-	-	-	-	-	-	-	-	10	1	2	-	-	-	-	2	22	lower	Cut in diaphragm, stomach, LT lung, pleural hemorrhage
	11	-	-	-	-	3	2	1	-	-	-	7	2	1	-	-	-	1	-	-	-	-	-	2	4	23	lower	
	12	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	lower	
avg			0		0	0.8	3.8		0.5		0	1.8	0.5		0.3		0	2.8	0.3		0.5		0	0.5	1.5	13		
Grade 3	13	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	upper	
	14	-	-	-	-	2	2	1	1	1	2	-	4	-	-	-	-	-	-	-	-	-	-	2	1	16	upper	Skull fracture and brain laceration, SAH
	15	-	-	-	-	1	5	5	-	1	1	8	1	-	-	1	-	-	-	1	2	-	-	-	-	26	middle	SDH, SAH, ICH
	16	-	1	-	-	3	2	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	-	-	5	15	middle	
	17	-	-	-	-	-	2	-	-	1	-	2	1	-	-	-	-	-	-	-	-	-	-	-	4	10	middle	
	18	-	-	-	-	7	1	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	2	14	middle	
	19	-	-	-	-	-	3	5	4	7	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	22	middle	SAH /SDH/ IVH/ skull Fractures brain laceration
	20	-	-	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	lower	
avg			0.13		0	1.6	2.4		3.5		0.6	1.4	0.8		0.25		0	0.5	0		0.75		0	0.3	1.5	13.6		
Total cases		1	2	-	-	10	20	7	4	5	3	6	5	1	2	1	-	7	2	3	3	-	-	6	11			

*C: Contusions, A: Abrasions, L: Lacerations, F: Fractures, S: Stab, I: Incise.

absent in males 7/11 cases (63.6%). One out of 8 cases above 45 years old had multiple superficial wounds. All 4 cases with grade 2 wounds are accompanied by superficial wounds.

3.3.3. Other Injuries in the Neck

Other neck injuries, such as stab wounds, were observed in 10 out of the 20 cases (50%). These stab wounds were mostly located at the upper level (4 out of 5 cases, or 80%) and the middle level (5 out of 9 cases, or 55.6%). All but one of these wounds were deep. There were only two cases of blunt injuries with contusions and abrasions out of 20 (10%).

3.4. Other Body Injuries in relation to level and depth of cut-throat injuries.

Table 2 details the overall injuries based on the depth of the cut-throat wound. On average, there were 15 bodily injuries, including neck injuries, with the total number ranging from 1 to 42. Blunt injuries, such as contusions, abrasions, and lacerations range from 1 to 19, were concentrated in the head and extremities, and were present in 11 of the 20 cases (55%). Skull fractures were observed in three cases (15%). Stab wounds were present in 11 of the 20 cases (55%) and ranged from 1 to 17, mostly affecting the head and trunk. Stabbing in the trunk was mainly associated with Grade 1 and 2 cut-throat injuries, while stabbing in the head was primarily associated with Grade 3 injuries. 60% of the cases (12/20) had incisions, with a range of 1 to 16 incisions, most commonly located on the head and extremities. Additional serious or fatal injuries were reported in 7 of the 20 cases (35%) and included injuries such as stab wounds to the heart, liver, lungs, and diaphragm, as well as cardiac tamponade, pleural and peritoneal hemorrhage, intracranial hemorrhage and brain laceration. These additional injuries were mainly associated with upper-level neck wounds (60% in upper-level cases, 33.3% in middle-level cases, and 20% in lower-level cases).

4. Discussion

Homicidal cut-throat injuries represent a significant challenge in forensic pathology, especially in terms of accurately determining the manner of death. By analyzing demographic data, toxicological results, neck injuries, other body injuries, and personal motives, we have expanded our understanding of the patterns and characteristics associated with homicidal cut-throat injuries.

4.1. Demographics

In our study, the majority of the cases involved victims over the age of 45 years, with a mean age of 37.4 years. This may be attributed to accumulated personal disputes that escalate into violence. In contrast, the absence of adolescent cases could be explained by the fact that younger individuals often do not engage in conflicts that lead to such extreme violence. Previous studies have shown that victims were predominantly in their 30s [3, 4, 5].

In our findings, 55% of the cases were male, which is lower than the percentages reported in other studies. For example, Rao's study indicated that males made up 71.62% of victims, a pattern that was also observed in studies by Buchade et al. [6, 7] and Ozdemir et al. [8]. The higher proportion of female victims in our study can be linked to familial conflicts and honor killings, which are commonly perpetrated by close male relatives such as sons, spouses, or fathers. These findings are consistent with a case series from eastern Turkey, where honor killings were reported as the second most common cause of homicidal cut-throat injuries, after mental illness [8].

Both genders were primarily found indoors, but being inside does not necessarily rule out the possibility of homicide [9]. Among males, 8 out of 11 cases occurred indoors, often related to family disputes, while 6 out of 9 female cases were linked to honor killings. Outdoor cases among males (27.3%) were more likely to result from quarrels.

4. 2. Toxicology

Drug use appears to be a contributing factor in cut-throat homicides, with CNS stimulants, depressants, and alcohol detected in many cases. In 6 out of the 11 toxicology screenings (54.5%), the victims tested positive, with 5 of these cases involving males. Unlike previous studies, most of which did not mention intoxication as a factor in cut-throat homicides [6], our findings suggest that drug use may play a role in the escalation of violence, however since in our study the toxicological results were not available in 45% of the cases and the available results were qualitative. Furthermore, in the literature, there is not enough data about toxicological results in homicidal cases [10]. Therefore, We recommend that quantitative toxicological studies be routinely performed in all homicide cases, to study their effect and role without any bias.

4.3. Neck Incised Wounds

Homicidal cut-throat injuries are typically inflicted when the assailant has control over the victim. This pattern is often observed in honor killings, where the victim may feel guilt, or in cases involving children (20%) [11] and victims under the influence of drugs (30%). Additionally, other fatal injuries are sometimes inflicted to subdue the victim. Adding to that, other neck injuries are caused to hold and overcome the victim, this is evidenced by the presence of stab wounds, mostly with the fatal neck incision in the upper 80% and middle 55.6% neck level.

The fact that major blood vessels are severed in all the cases and the incision reached the bone in a good number of cases suggests that this method is highly effective at ensuring death. Despite the presence of additional fatal injuries, such as stab wounds or blunt head trauma in 30% of cases (6 out of 20), the main cause of death in these cases was the cutthroat injury, indicating the insistence on choosing the neck. The presence of multiple deep incised wounds also points to an element of repetition and intent.

The concept of “overkilling”—where excessive force is used to inflict massive injuries far beyond what is necessary to cause death—is relevant here [12, 13]. Overkill is often associated with malice, spite, and revenge motives. In our study, this pattern was observed in two cases (cases 14 and 19) involving a robbery, where a shepherd was killed first to coerce a rich victim into compliance. Both victims suffered multiple stab wounds in the face and deep incisions in the neck.

4.3.1. Superficial and Deep Neck Incisions

Regarding the depth of wounds, it was observed that Grade 3 cut wounds were almost always seen in males (7 out of 8 cases) due to revenge motives. Furthermore, bending the neck as an act of resistance resulted in predominantly Grade 3 cut wounds at the middle level (5 out of 8 cases), with all Grade 2 cut wounds occurring at the lower level. Additionally, Grade 3 wounds were more common in individuals over the age of 45 (5 out of 8 cases), whereas Grade 1 and Grade 2 wounds were more common in individuals under the age of 45 (8 out of 12 cases). This observation may be attributed to the accumulated problems in the age group over 45 years old.

When considering the occurrence of deep cut wounds in the neck, it is observed that in most cases where the neck is cut, the assailant tries to straighten the victim's neck, while the victim resists by bending their own neck. This is evident from the presence of superficial wounds exclusively in the lower level due to the neck bending, and the absence of such wounds in the upper level in any case. Subsequently, the assailant overpowers the victim and straightens their neck, which explains why the majority of deep wounds in cutthroat cases were found in the upper and middle levels (14 out of 20 cases).

Superficial wounds that run parallel to deeper incisions are often regarded as hesitation marks in suicide cases [3, 4, 5]. However, in this study, we observed that superficial wounds can also occur in homicidal cases, Several factors can explain this phenomenon, including the victim flexing their neck for protection, the assailant's determination to target and cut the neck despite resistance, the presence of skin creases when the neck is flexed, and the use of extortion as a means to extract information. A few homicidal cases in the literature have reported the presence of tentative injuries accompanying the deeper incisions, this was explained by the dullness of the knife blade, the assailant being drunk, and the unconscious victim being unable to defend themselves [10, 14]. It should be noted that in cases of infants or children who are unable to defend themselves, the superficial wounds do indicate actual hesitation on the part of the mother [8] or the father [11]. In female victims, 66.7% displayed superficial wounds, which may indicate extortion as a motive, whereas 63.6% of male victims did not show superficial wounds.

4.4. Other Body Injuries

Additional body injuries were observed in 15 out of 20 cases, including blunt force trauma, stab wounds, and incised wounds. The presence of these injuries can be attributed to factors such as quarrels, self-defense, or the assailant's attempt to ensure death.

Firstly, Grade 1 cut wounds, which are less deep, were associated with a higher number of other injuries, possibly because these victims remained vital and able to struggle. Secondly, sharp injuries, primarily to the extremities (11 cases), suggest that the victims saw the weapon and attempted to defend themselves with their hands. Injuries to the lower extremities were notably absent in our study. Two types of defense injuries in extremities were common in homicidal cases, passive injuries when the victim uses their limbs as a shield and active injuries when they try to grab or push off the weapon [14, 15, 16]. Thirdly, stab wounds in the trunk were more common in Grade 1 neck cut cases (4 out of 8 cases) than in Grade 3 cases (1 out of 8), possibly because the assailant was less confident that the neck injury alone would be fatal [6]. Fourthly, to overcome the victim, additional fatal injuries are inflicted with the same tool and are often accompanied by blunt injuries. These injuries are primarily associated with the upper level of the cut neck injury (60%). Finally, extortion-related injuries are typically limited to exposed areas on the face (6 out of 20 cases) that are not covered by hair, mostly done to force the victim to obey the assailant's command. They are more commonly observed in cases involving Grade 3 cut wounds. In cases of extortion, injuries were often confined to the face (6 out of 20 cases), where the victim's hair did not provide coverage. Extortion injuries were more common in cases involving Grade 3 neck wounds.

In five cases, no additional body injuries were observed. Three of these involved children, likely due to their inability to defend themselves. In one adult male case (case 9), drug intoxication (alcohol

and amphetamines) likely impaired the victim's ability to resist, while in a female case (case 12), feelings of guilt and surrender may explain the absence of injuries. In comparison with other studies, these wounds may be absent when the attack is not expected from the assailant and the fatal wound is single, accordingly, their absence doesn't exclude the possibility of homicide [15, 17].

5. Conclusion

Forensic pathologists should exercise caution when determining the manner of death in cutthroat injuries, carefully considering the relationship between the depth and level of deep neck wounds, superficial neck wounds, and other bodily injuries. Our findings reveal that even in homicidal cutthroat cases, superficial incisions parallel to the primary deep neck incision are common, particularly when the incision is located in the lower level (below the larynx). Therefore, we emphasize avoiding labeling these superficial incisions as hesitation marks, as they may appear in homicidal cases, often due to factors such as the victim flexing their neck defensively. Additionally, other fatal injuries are frequently present when the primary neck incision is located in the upper level (above the larynx). This pattern may suggest a sequence of injuries, indicating that the victim may have surrendered and been unable to flex their neck after sustaining severe trauma, resulting in a main cut wound in the upper neck without accompanying superficial incisions. Thus, cut throat injuries should be examined in conjunction with other bodily injuries to uncover patterns and potential motives. Careful analysis and interpretation of these findings are crucial in delivering justice to victims and their families.

Conflict of interest

The authors declare no conflicts of interest.

Source of funding

The authors received no financial support for the research, authorship or publication of this paper.

Acknowledgements

The authors would like to thank the medical students Nada Almasad and Nadia Jendli for providing language help.

References

1. Krug, E. G., Sharma, G. K., & Lozano, R. (2000). The global burden of injuries. *American journal of public health,90*(4), 523–526. https://doi:10.2105/ajph.90.4.523
2. Gilyoma, J. M., Hauli, K. A., & Chalya, P. L. (2014). Cut throat injuries at a university teaching hospital in north-western Tanzania: a review of 98 cases. *BMC emergency medicine*. 14, 1. https://doi.org/10.1186/1471-227X-14-1
3. Fukube, S., Hayashi, T., Ishida, Y., et al (2008). Retrospective study on suicidal cases by sharp force injuries. *Journal of forensic and legal medicine*. 15(3), 163–167. https://doi:10.1016/j.jflm.2007.08.006
4. Karger, B., Niemeyer, J., & Brinkmann, B. (2000). Suicides by sharp force: typical and atypical features. *International journal of legal medicine*. 113(5), 259–262. https://doi:10.1007/s004149900093
5. Ohshima, T., & Kondo, T. (1997). Eight cases of suicide by self-cutting or -stabbing: consideration from medico-legal viewpoints of differentiation between suicide and homicide. *Journal of Clinical Forensic Medicine*. 4, 127-132.
6. Rao, D. (2015). An autopsy study of 74 cases of cut throat injuries. *Egyptian Journal of Forensic Sciences*. 5(4), 144-149. https://doi:10.1016/j.ejfs.2014.10.001
7. Buchade, D., Kukde, H., Dere, R., et al. (2012). Autopsy study of cut throat cases brought to Morgue of Sion Hospital, Mumbai: A three-year study. Indian *Journal of Forensic Medicine & Toxicology*. 6(2), 44-46.
8. Ozdemir, B., Celbis, O., & Kaya, A. (2013). Cut throat injuries and honor killings: Review of 15 cases in eastern Turkey. *Journal of Forensic and Legal Medicine*.

20(4), 198-203. https://doi:10.1016/j.jflm.2012.09.011

9. Mazzolo GM, Desinan L. (2005) Sharp force fatalities: suicide, homicide or accident? A series of 21 cases. Forensic Sci Int,147(Suppl):S33-5.
10. De-Giorgio, F., Lodise, M., Quaranta, G., Spagnolo, A. G., d'Aloja, E., Pascali, V. L., & Grassi, V. M. (2014). Suicidal or Homicidal Sharp Force Injuries? A Review and Critical Analysis of the Heterogeneity in the Forensic Literature. *Journal of Forensic Sciences*, 60, 97–107. https://doi.org/10.1111/1556-4029.12673
11. Herbst J, Haffner HT. (1999) Tentative injuries to exposed skin in a homicide case. *Forensic Sci Int*,102,193–6.
12. Enos, W. F., & Beyer, J. C. (1980). Sex crimes. In W. U. Spitz & R. S. Fisher (Eds.). *Medicolegal Investigation of Death*. 2nd ed. Charles C Thomas. 511–526.
13. Douglas, J. E., Burgess, A. G., & Burgess, R. K. (1992). *Crime Classification Manual*. 1st ed. Jossey-Bass.39.
14. Betz P, Tutsch-Bauer E, Eisenmenger W. (1995) "Tentative" injuries in a homicide. *Am J Forensic Med Pathol*,16, 246–8.
15. Hunt AC, Cowling RJ. (1991) Murder by stabbing. *Forensic Sci Int*, 52:107–12.
16. Gill JR, Catanese C.(2002) Sharp injury fatalities in New York City. *J Forensic Sci*, 47:554–7.
17. Schmidt U.(2010) Sharp force injuries in "clinical" forensic medicine. *Forensic Sci Int*,195:1-5