

Article

Pathological Mechanisms and Additional Factors Involved in Complex Neck Traumatology

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Abstract: *Background.* Cervical trauma can be closed or open, have different degrees of severity, incidence rates, prevalence, or mortality, with variations in the presence of demographic factors. The different types of traumatic injuries have a certain pattern of occurrence depending on criteria related to sex, age, alcohol consumption, and socio-demographic factors. Increasing the rate of trauma is becoming a public health problem and it is necessary to study their epidemiology and implement control strategies. *Aims.* The objectives of the study are to establish the particularities of epidemiological, morphopathological, and pathophysiological factors involved in complex neck traumatology. *Methods.* The study group consisted of 384 patients, representative for the population of Moldova, who presented at the ENT Clinic, Hospital “St. Spiridon” Iași and the Institute of Forensic Medicine, Iași during 2012–2016, with complex cervical trauma pathology, produced by various mechanisms, such as car accidents, domestic accidents, aggressions, ballistic trauma, self-inflicted attempts, hanging or strangulation. Data were collected from autopsy reports and medical records. *Results.* Complex cervical trauma occurs with a predisposition in males, with an average age of 43 years, from rural areas. The mechanism of cervical trauma is predominantly self-inflicted—hanging in 78.4% of the total number of cases, followed by 14.8% of stabbing aggression. The majority of neck injuries, both open and closed, are located in anatomical zone II (73.6%), vascular and pharyngeal are produced by stabbing. Psychiatric disorders and blood alcohol levels are correlated with complex cervical trauma caused by self-inflicted mechanism—hanging and can be considered a predictive factor of suicide attempts. *Conclusions.* Overall, the vast majority of closed neck injuries were caused by the self-inflicted mechanism, attempted suicide by hanging, followed by the accidental mechanism. Regarding the penetrating complex aero-digestive cervical traumas, they were mostly produced by stabbing both in aggression and self-inflicted circumstances. Aggravating addictive factors such as alcoholism and mental disorders require a competent assessment in terms of the indication of institutionalized treatment, prevention of repeated self-inflicted attempts, or social reintegration.

Keywords: complex cervical trauma; mechanism of cervical trauma; morphopathological and pathophysiological factors



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1. Introduction

Complex cervical traumas represent an otorhinolaryngological emergency with a constantly increasing incidence, representing 5–10% of cases that occur in emergency units, and are accompanied by significant mortality [1]. Traumatic injuries, which can occur, can be closed or open (penetrating/non-penetrating), and the determining mechanism varies from self-inflicted, aggression, or accidental. Socio-demographic factors, age, sex, pathological history, mental health, and access to health care are important epidemiological factors of the evolution and prognosis of trauma, but also on the results of statistical analysis [2]. The neck region contains the highest density of vital organs condensing in

an anatomical area, which is not protected by a skeletal bone and makes it vulnerable to traumatic agents. The diversity of cervical anatomical elements determines the appearance of at least as many types of lesions [3,4].

Today, the mortality rate for penetrating traumatic neck injuries is 3–6%, with 50% of deaths caused by hemorrhagic vascular injuries [5]. A complex pathology in continuous growth, with varied and severe evolution, the ENT surgeon must be prepared in terms of diagnosis and therapeutic approach regardless of the mechanism of production, lesion severity, or socio-demographic factors. There are several confounding factors that can influence the results and, more critically, the interpretation and conclusions of traumatological epidemiological analysis, which include: ethnicity, culture, socioeconomic status, access to health care, mental health, alcohol consumption, and other drugs. Due to their number and multitude, adequate control for any of the factors is difficult to achieve. Therefore, caution is advised in making generalizations about some epidemiological findings [6].

Injuries of the neck can be both open and closed, superficial and penetrating [7]. Penetrating cervical trauma is present in approximately 10% of all trauma patients [8,9].

While open traumatic injuries to the neck are most commonly associated with acts of violence, they are also found in the road, sports, and occupational accidents. The penetration mechanism is important in determining the severity of the injury and the therapeutic behavior. Inevitably, vascular injury is the most common complication of penetrating neck injuries, which occur in about a quarter of all cases and have a mortality rate of almost 50% [10]. Laryngeal-tracheal injuries occur in a tenth of cases, and mortality in these cases is close to 20% [11,12]. Internationally, the rate of penetrating neck injuries is usually closely linked to the rate of violence and the existence of military conflicts in a given country. Today, the mortality rate for penetrating traumatic neck injuries is 3–6%, with 50% of deaths caused by hemorrhagic vascular injuries.

Traumatic neck injuries can be classified according to the existence of a solution of skin continuity in: closed and open and depending on the zonal character: zone I (clavicle—cricoid cartilage), zone II (cricoid cartilage—mandible angle), zone III (between mandible angle and skull base). Depending on the severity and the presence or absence of polytraumas and comorbidities, the previous cervical traumas are also classified into major/complicated and minor/simple [13]. Closed traumas are caused by direct blows with and blunt bodies and mechanical asphyxia (hanging, strangulation, and strangulation). Open injuries are caused by sharp objects and firearms [14,15]. Closed injuries are most commonly caused by road accidents. The incidence of this type of injury is decreasing due to the obligation to wear seat belts, airbags, speed limits, and legislation regarding driving under the influence of alcohol. The mechanism of production consists of the anterior propulsion of the driver with the neck in hyperextension, during rapid deceleration. This position involves the loss of bone protection provided by the mandible, exposing the larynx to the forces of destruction, and hitting it by the steering wheel or the dashboard of the car. Injuries caused by strangulation or strangulation are caused by manual cervical compression or by strangulation with soft objects, in circumstances of aggression, and by hanging in self-inflicted attempts. This mechanism will cause mechanical obstruction of the airway at the pharyngo-laryngeal level and reflexes by compressing the vital cervical centers: the vagus nerve, the superior laryngeal nerve, and the sino-carotid area [16]. Closed external traumas can lead to endoluminal tissue injuries, cartilaginous fractures, ruptures of the laryngeal, laryngeal-tracheal and tracheal ligaments, combined ligament, cartilaginous, and soft tissue injuries [15]. Open neck injuries can be classified according to the criterion of interest of the platysma muscle in penetrating and non-penetrating [17]. Penetrating injuries are on the rise due to the increase in the rate of physical aggression. They can be produced by firearms or by stabbing. Knives, glass fragments, shaving blades usually lead to a more predictable trajectory of penetrating wounds [18]. Lesions produced by cutting objects are limited to their tissue path, an estimated path between the inlet and the outlet [14]. Firearms cause very extensive damage and are caused by the trajectory of the projectile, but also by the adjacent soft tissues due to the transfer of kinetic energy. The

severity and extent of ballistic tissue damage at the point of impact depend on the speed of the projectile at the point of entry and exit, the distance from which the firearm is fired, the type and number of projectiles used, the anatomical area where the impact is, the existence of an intermediate object on the trajectory of the projectile, the stability of the projectile at impact, the presence of pathology at the place of impact [19,20]. The final injury is the result of the permanent cavity created by the passage of the projectile, of the temporary cavity determined by its energy, and by the obstacles in which it bounced [20,21].

Recovery of patients with traumatic injuries begins immediately postoperatively, by promoting mobilization as early as possible after the intervention, personal hygiene, adaptation, and care of medical devices, which secure the respiratory or digestive tract: tracheostomy, nasogastric tube, or gastrostomy, involves the appearance of difficulties social reintegration. These difficulties start with minor hygiene maneuvers and constant grooming of the tracheal cannula, requiring understanding and support from the family. Depending on the severity of the traumatic injury and the respiratory and phonatory functional impairment, the patient's ability to work must be re-evaluated to determine whether he is fit to resume his previous professional activity or needs reorientation. Phonation and swallowing disorders developed after cervical trauma of neurological interest involve the assessment of functional deficit and the indication of vocal therapies and sustained exercises for recovery of these functions and thus reinsurance of social and family reintegration [22].

Regarding the complex cervical traumas produced by self-inflicted mechanism, aggression, or accident, in which there is or is not a psychiatric pathology diagnosed in the antecedents, an important role in the recovery and social reintegration is played by the psychological and psychiatric evaluation and dispensary. Acute post-traumatic stress, reactive depression, anxiety can occur as a result of penetrating trauma through aggression, and lack of identification and treatment of these situations can have long-term repercussions in terms of mental health, community relationships, and socio-professional reintegration. Patients diagnosed with psychiatric pathologies (depression, bipolar disorder, schizophrenia, dementia) before the traumatic event, whose decompensation or lack of treatment associated with addictive aggravating factors (alcoholism, narcotics) require their re-evaluation and competent treatment. Depending on the results of the evaluation and psychiatric expertise, it will be established whether the patient needs institutionalized therapy or social reintegration can be attempted.

Currently, in health systems in developed countries and with well-implemented social policies, there is the so-called "post-traumatic resuscitation team", a concept used in social recovery and reintegration as the ATLS resuscitation protocol is used. This team consists of the doctor who treated the implicit trauma, physiotherapist, occupational and vocational therapist, speech therapist, psychologist/psychiatrist, dietitian, and social worker. Its purpose is to evaluate, treat and monitor the patient with the progress of his recovery, for family, community, and professional reintegration [22,23].

The objectives of the study are to establish the epidemiological, morphopathological, and pathophysiological factors involved in complex neck traumatology.

Our goal is to investigate the prevalence of complex aero-digestive traumas in a reference university medical center, along with the analysis of the characteristics of the patients under different aspects such as demographic and morphopathological, as well as the evaluation of the factors, which are involved in the determinism of the negative prognosis.

The paper is structured as follows: in Section 2, we expose the materials and the methods used to perform the study, the results obtained are structured in Section 3. This is followed by Section 4. in which we discuss our results and their interpretation in comparison with other studies in the literature and conclude in Section 5.

2. Materials and Methods

The study group consisted of 384 patients from all counties of Moldova, with complex cervical trauma pathology, produced by various mechanisms, such as car accidents, domes-

tic accidents, aggression, ballistic trauma, self-inflicted attempts, hanging or strangulation, performed between 2012–2016. The sample size ($n = 384$) is representative of the population of Moldova, the North-East development region with a population of about 3.302 million inhabitants [24]. The sampling error was $\pm 5\%$. The study group was divided into two groups according to the clinic in which the patients were investigated, as follows: first group—106 patients hospitalized in the ENT Clinic, “St. Spiridon” Iași and second group—278 patients from the Institute of Forensic Medicine, Iași, who died of complex cervical pathology. Patient data collected for this study were kept confidential. This research study was submitted to the analysis and then to the approval by the Ethics Committees of both “Grigore T. Popa” University of Medicine and Pharmacy and the “Sf. Spiridon” Emergency Hospital, Iași. Both of the institutions are tertiary hospitals for that region of the country. The information selected from the observation sheets was in the following categories: demographic data, epidemiological characteristics, lesion appearance and mechanism, cervical location corresponding to defined areas of the neck, type, and extent of injured tissues, paraclinical investigations, associated pathologies or recurrences, therapeutic approach, complications, and also the data obtained from the regular consultations performed at the hospital discharge.

General exclusion criteria: age under 18 years; the patient’s refusal to participate, the presence of cervical trauma in the past but without pathological lesions, or only superficial lesions without being accompanied by symptoms.

The data were uploaded and processed using the statistical functions in SPSS 18.0. Significance tests used: t-Student test, F test (ANOVA), Kruskal-Wallis correlation “Pearson” correlation coefficient (r), linear trend ($y = ax + b$).

3. Results

3.1. Determining the Mechanism of Cervical Trauma

In our study, were included 384 patients, three predominant mechanisms were identified: self-inflicted, aggression, and accidental. Statistically, the determining mechanism of cervical trauma on both groups was the self-inflicted one with a percentage of 78.4%, followed by aggression in 14.8% of cases, and last but not least, the accidental mechanism in a percentage of 6.8% (Figure 1). Compared to study groups, the ANOVA test was used to highlight statistically significant percentage differences ($p = 0.001$):—in group 1 ($n = 106$), the lesion determining mechanism through aggression (39.6%) was more frequently noticed, followed by the self-inflicted mechanism (39.6%) and the accidental mechanism (22.6%); (Figure 2)—in group 2 ($n = 278$), in 93.9% of patients the self-inflicted mechanism was present, to the detriment of aggression (5.4%) and the accidental mechanism (0.7%) (Figure 2). In patients in group 1, stabbing aggression predominates (39.6%) and the self-inflicted mechanism by hanging (22.6%) (Table 1). In patients in group 2, the most common mechanism was autolytic by hanging (91%) followed by stabbing aggression (4.3%) (Table 2). Regarding the lesion aspect, the patients from group 1 were statistically analyzed, regarding the classification of cervical traumas in closed/open and penetrating/non-penetrating. Therefore, penetrating open cervical traumas were identified in 87.5% of cases caused by accidental mechanism and 66.7% of cases caused by aggression, respectively. It is observed that non-penetrating/closed traumatic injuries are present in 65% ($p = 0.001$) in the case of those determined by self-inflicted mechanisms (Figure 3).

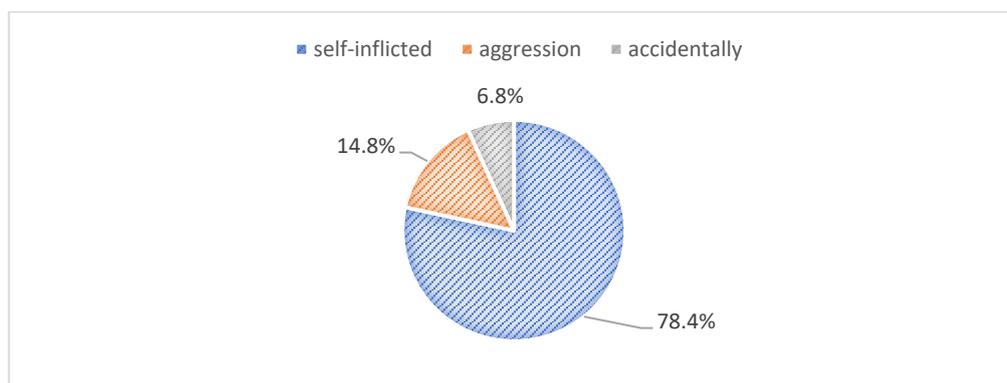


Figure 1. Distribution of cases according to the lesion mechanism.

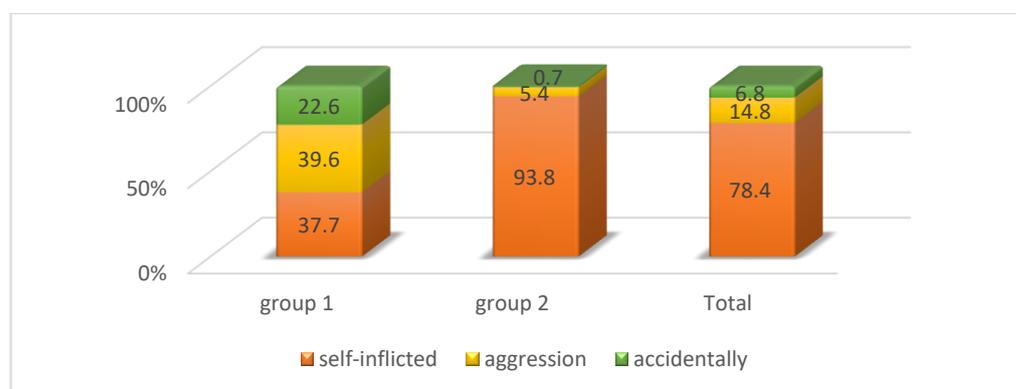


Figure 2. The structure of the groups according to the lesion mechanism.

Table 1. Types of mechanisms identified on study groups.

Mechanisms	Group 1	Group 2
Self-inflicted		
Hanging	24 (22.6%)	253 (91.0%)
Stabbing	6 (5.7%)	0 (0.0%)
Aggression		
Stabbing	42 (39.6%)	12 (4.3%)
Constriction	6 (5.7%)	7 (2.5%)
Accidentally		
Work accident	7 (6.6%)	0 (0.0%)
Domestic accident	3 (2.8%)	1 (0.4%)
Road accident	2 (1.9%)	1 (0.4%)
Falling from a height	8 (7.5%)	0 (0.0%)

Table 2. The correlation between the lesion mechanism and the comparative epidemiological characteristics on study groups.

Characteristics	Group 1			p	Group 2			p
	Self-Inflicted (n = 40)	Aggression (n = 42)	Accidentally (n = 24)		Self-Inflicted (n = 261)	Aggression (n = 15)	Accidentally (n = 2)	
Male n (%)	38 (95.0%)	36 (85.7%)	21 (87.5%)	0.326	232 (88.9%)	7 (46.7%)	1 (50.0%)	0.051
Rural n (%)	22 (55.0%)	25 (59.5%)	13 (54.2%)	0.884	194 (74.3%)	11 (73.3%)	1 (50.0%)	0.763
≥45 age n (%)	18 (45.0%)	18 (42.9%)	11 (45.8%)	0.967	148 (56.7%)	7 (46.7%)	1 (50.0%)	0.739

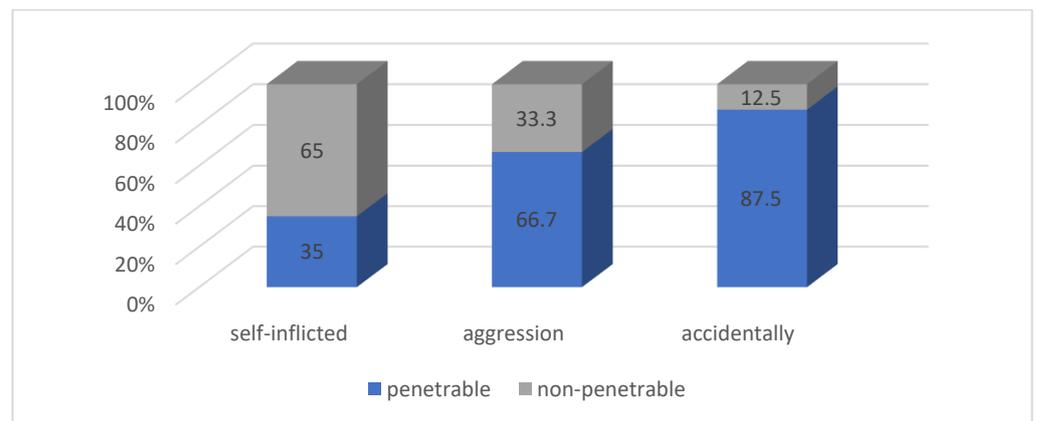


Figure 3. Distribution of cases in group 1 according to the appearance and mechanism of the lesion.

3.2. Anatomical Location of the Injury

In the patients from group 1, depending on the determining mechanism of the cervical trauma, the following lesion distribution was noticed on the three cervical anatomical areas. ($p = 0.002$) (Table 3, Figure 4). In anatomical area I, between the upper edge of the sternum and the clavicle, up to the cricoid cartilage, there were a total of 10 patients with traumatic injuries, respectively 9.4% of the total number of patients included in the study, of which the lesion mechanism determined was the accidental one, with 7 patients (16.7% of the total); in anatomical area II, located between the cricoid cartilage and the angle of the mandible, there were a total of 78 patients with traumatic injuries, respectively 73.6% of the total number, of which the self-inflicted mechanism was the determining factor of the injuries in 92.5% of cases (37 patients). In anatomical area III, located between the angle of the mandible and the base of the skull, there were a total of 11 patients with traumatic injuries, respectively 10.4% of the total number, among the determining mechanisms of the injury, the accidental was predominant in 6 cases, closely followed aggression with 5 cases. Traumatic injuries spread over several anatomical areas were found in 7 patients, 6.6% of the total number; 61.9% of patients with aggression had lesions in zone II, and 16.7% in zone I, and 11.9% in zone III; 92.5% of patients with self-inflicted lesions were found in area II, 5% in area I, 0% in area III and 2.5% in combined areas, 62.5% of patients with accidental mechanism had lesions in zone 2, and 25% in zone III.

Table 3. Correlation between the lesion mechanism and the anatomical area in patients in group 1.

		Area * Mechanism			
Area		Self-Inflicted	MECHANISM Aggression	Accidentally	TOTAL
		Area I	No. 2	7	1
	% mechanism	5.0%	16.7%	4.2%	9.4%
Area II	No.	37	26	15	78
	% mechanism	92.5%	61.9%	62.5%	73.6%
Area III	No.	0	5	6	11
	% mechanism	0.0%	11.9%	25.0%	10.4%
Mixt	No.	1	4	2	7
	% mechanism	2.5%	9.5%	8.3%	6.6%
TOTAL	No.	40	42	24	106
	% mechanism	100.0%	100.0%	100.0%	100.0%

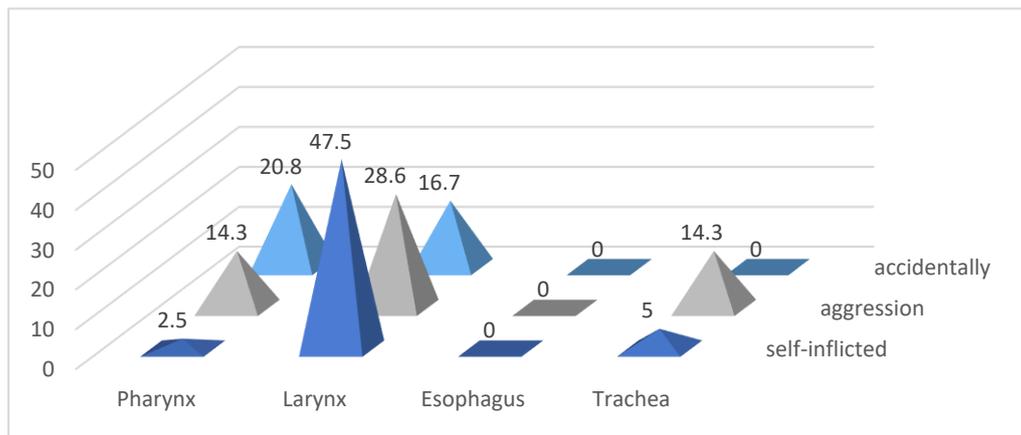


Figure 4. Distribution of cases in group 1 according to the presence of aero-digestive visceral lesions and the lesion mechanism.

In the patients of group 2 ($n = 278$), who died as a result of complex cervical traumas, the following lesional aspects were identified following the research of post-mortem examination reports (Figure 5): skin lesions were found in 99.6% of patients in group 2 ($p = 0.939$); muscle injuries were present in all patients with injuries caused by aggression and in 50% of those with accidental injuries, while the share of patients with injuries caused by self-inflicted mechanism was 23.8% ($p = 0.001$); pharyngeal lesions were found with relatively low weights both in the case of aggression (46.7%) and in the case of the self-inflicted mechanism (2.3%) ($p = 0.001$); laryngeal lesions were noted in 73.3% of patients with aggression and 50% of those with accidental mechanism, while the share of patients with autolytic mechanism was only 2.7% ($p = 0.001$); tracheal lesions were present in 46.7% of patients with aggression and in 50% of those with accidental mechanism, while in patients with self-inflicted mechanism the share was 2.3% ($p = 0.001$); hyoid lesions were found in 50% of patients with accidental mechanism and in 46.7% of those with aggression, percentage differences significantly higher than in the case of the self-inflicted mechanism where the weight was only 7.7% ($p = 0.001$) (Figure 5).

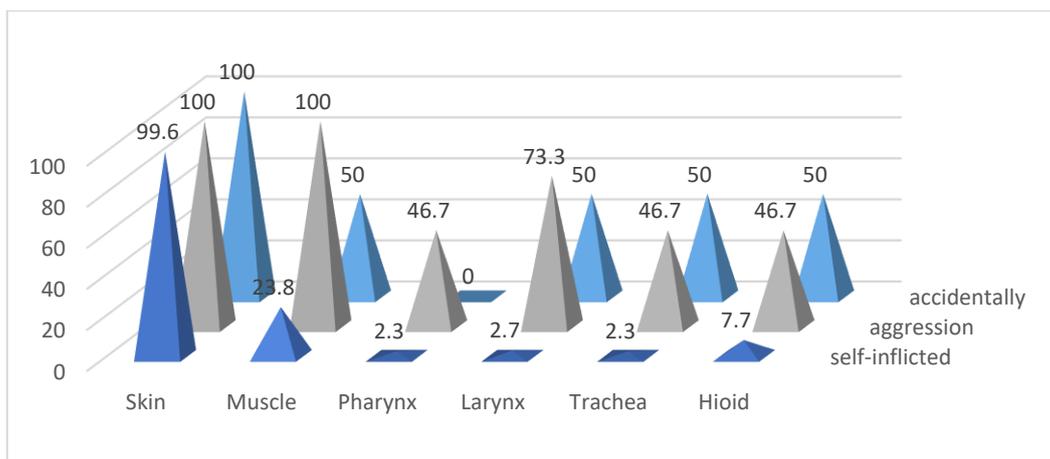


Figure 5. Distribution of cases in group 1 according to the presence of aero-digestive visceral lesions and the lesion mechanism.

3.3. Comorbidities

Alcoholism was identified in 29.2% of patients in group 1 ($n = 106$), of which 16% were diagnosed with acute alcoholism and the remaining 13.2% chronic alcoholism, of which 93.5% were male, 51.6% aged under 45, and 54.8% of rural residence (Figure 6). The

correlation of alcoholism with the mechanism of production of complex cervical traumas was significantly observed in the case of self-inflicted in the proportion of 42.5%, followed by that by aggression 26.2% of cases and last but not least 12.5% in the case of accidental mechanism, obtaining after the application of the ANOVA test a $p = 0.028$ (Figure 7).

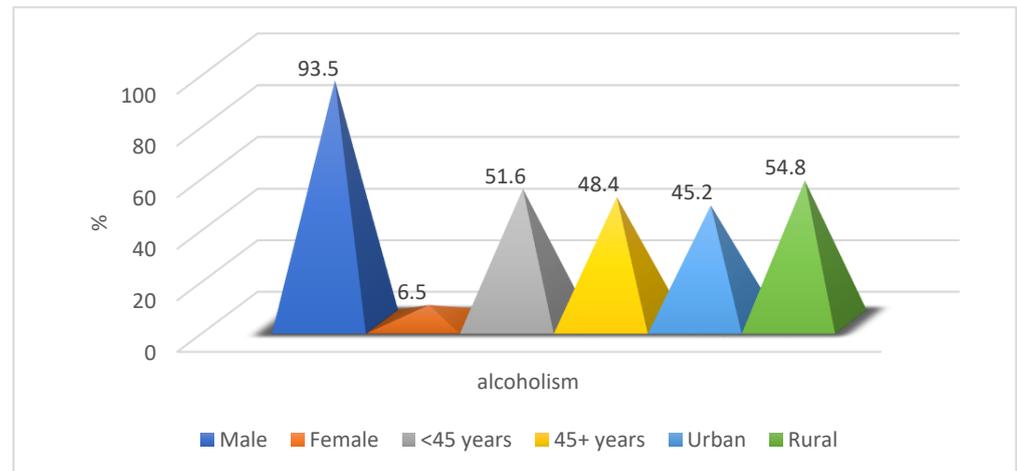


Figure 6. Epidemiological characteristics of patients in group 1 with alcoholism.

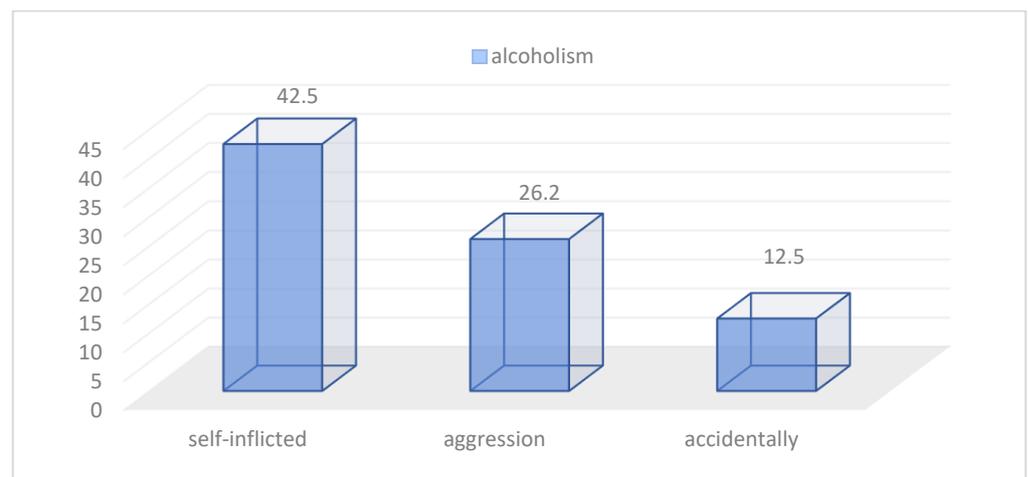


Figure 7. Distribution of cases in group 1 with alcoholism according to the lesion mechanism.

The blood alcohol concentration was compulsorily measured in all patients in group 2 ($n = 278$), and it varied in the range 0–3.85‰, recording an average level of 0.93 ± 1.02 ‰ and the median of 0.60‰, a standard deviation of 1.02, however, Skewness tests ($p = 0.697$) and Kurtosis ($p = -0.733$) suggest the normality of the series of values (Table 4, Figures 8 and 9). In the case of group 2, it was found that the blood alcohol concentration was significantly higher in patients with lesions caused by self-inflicted mechanism, the average value being 0.94‰ with the standard deviation of 0.92‰, while in patients with lesions produced by accidental mechanism, the presence of alcohol was not detected. It should be noted that the aggressed patients also had a rather high blood alcohol level with an average value of 0.84‰, with a standard deviation of 0.87‰. The F test (ANOVA) was applied to the values of the three groups of patients, obtaining a $p = 0.048$. (Tables 4 and 5). Regarding the mechanism of production of complex cervical traumas, alcoholism was correlated with the self-inflicted mechanism in 56.3%, respectively, with aggression in 46.7% of cases ($p = 0.151$), whereas in the case of accidental traumatic injuries, no blood alcohol concentration was identified (Figure 10).

Table 4. Alcohol statistics in patients in group 2.

	No	Valid	278
Mean			0.93
Median			0.60
Dev. Std.			1.02
Variance			1.05
Skewness			0.697
Std. Error of Skewness			0.146
Kurtosis			−0.773
Std. Error of Kurtosis			0.291
Minimum			0
Maximum			3.85
Percentile		25	0
		50	0.60
		75	1.75

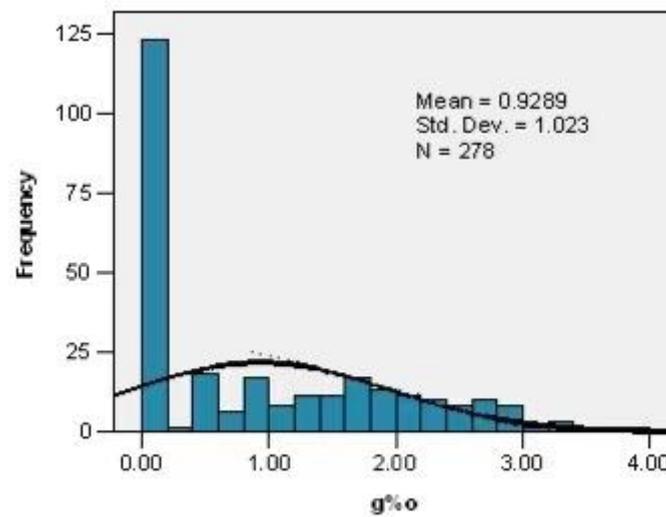


Figure 8. Histogram of blood alcohol concentration recorded in patients included in group 2.

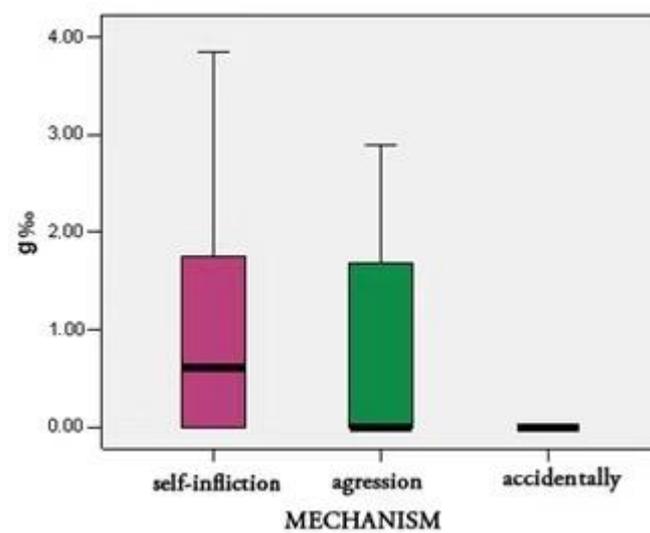


Figure 9. The average blood alcohol concentration in patients in group 2 depending on the mechanism lesion.

Table 5. Descriptive indicators of alcoholism depending on the lesion mechanism.

Mechanism	n	Mean	Std. Dev.	Std. Error	CI 95%		Min	Max	Test F (ANOVA) p
					−95%CI	+95%CI			
Self-inflicted	261	0.94	0.92	0.06	0.82	1.07	0	3.85	0.048
Agression	15	0.84	0.87	0.28	0.25	1.43	0	2.90	
Accidentally	2	0.00	0.00	0.00	0.00	0.00	0	0.00	
TOTAL	278	0.93	0.72	0.06	0.81	1.05	0	3.85	



Figure 10. Distribution of cases in group 2 with alcoholism according to the lesion mechanism.

Among the main psychiatric disorders identified in the case studies studied were: depressive syndrome—17 cases (16% of total group 1), personality disorders—8 cases (7.5% of total group 1); 2 cases (1.9%) had dementia syndrome, schizophrenia, psychomotor agitation, and mental retardation. Mental disorders were identified in 62.5% of patients with self-inflicted mechanisms and only in 9.5% of those with aggression, without being noticed in patients with accidental mechanisms ($p = 0.001$).

4. Discussion

The resulting statistical aspects tended to highlight the complex cervical traumatology in its magnitude. Cervical trauma is rare, and can generally result from closed, open, or combined mechanisms. Even though many of these traumas are minor, the complex and vulnerable anatomy of the neck predisposes to life-threatening events when complex traumas occur or when complications occur [25].

Onotai et al. identified, in the study, the preponderance of males in the distribution of cervical trauma cases and concluded that it is due to behavioral disorders, active participation, and involvement in violent conflict situations. This has a great economic impact, as they are mostly in the working-age category, and these traumatic injuries impose a considerable burden on their families and society as a whole [26].

In the study by Al-Thani et al., the determined injury mechanism is represented in a proportion of 29% by road accidents, 17.6% by stabbing, accidental falls 9.8%, and aggression 7.8% [27]. Aich et al. reported 67 cases; 48 (71.6%) cases with injuries caused by aggression, 12 (17.91%) cases of accidental injuries, and 7 (10.44%) cases with suicide attempts [28]. In the study performed, on group 1, the lesion determining the mechanism by aggression (39.6%) was more frequently noticed, followed by the self-inflicted mechanism (39.6%) and accidental mechanism (22.6%); respectively on group 2, in 93.9% of patients, the self-inflicted mechanism was present, to the detriment of aggression (5.4%) and the accidental mechanism (0.7%). Accidental mechanisms were represented by: work accidents, car accidents, domestic accidents, and accidental falls.

Herzog et al. classify traumatic cervical injuries on the three anatomical areas: zone I include lesions located between the cricoid and clavicles, zone II between the cricoid and

the mandible angle, respectively zone III, lesions located between the mandible angle and the base of the skull [29]. Given the disposition of the lesions on anatomical areas, lesional aspects were identified on all three areas. In our study, the data obtained are consistent with those of most studies, the lesions identified in zone II were 73.6%.

Sachdeva et al. identify patients with mental disorders in which schizophrenia predominates (in 2 out of 17 patients), followed by hallucinations. These patients were treated psychiatrically from the time of admission, with an indication for discharge counseling [30]. Nock et al. also suggest that psychiatric disorders play an important role in the etiology of cervical trauma [31]. The same elements of psychiatric pathology were identified in the study, revealing the important role, as a predisposing etiological factor, of traumatic pathology. Patients with traumatic cervical injuries caused by self-inflicted attempts, regardless of the pre-existence of a psychiatric pathology diagnosed in the past, should be subjected to psychiatric evaluation.

Teixeira et al. [32], in 2016, in a study conducted on 181 patients with complex cervical trauma, identifies the following aspects: from an epidemiological point of view, patients are predominantly male, of rural residence, with an age average of 26 years; unlike our study, where the predominant lesions are penetrating, produced by aggression—stabbing (76%), while our results show that the predominant lesions were self-inflicted type produced by hanging. Of these traumatic injuries with a penetrating open character, 8 (25.8%) were identified in zone I, 17 (54.8%) in zone II, and zone III 6 injuries, respectively 19.4%, resulting in agreement with those obtained in our study.

In the 2014 study on self-inflicted stabbing attempts, Bietry et al. [33] identified the preponderance of male patients over female patients, reflecting the tendency of men to choose an aggressive method, such as strangulation, as a method of suicide, shooting, stabbing, or road accidents. The predisposing factors identified were alcohol consumption and mental disorders in the personal history. Patients with mental disorders tend to self-induce deeper stabbed wounds and choose the knife mainly as a traumatic object. This study, as well as the data obtained in the present, are consistent with the data obtained in the literature regarding the elements of psychic nature and their role in cervical trauma.

Data from the literature show that among severe mental disorders, endogenous psychotic disorders, such as emotional disorders and schizophrenia, cause the most violent attempts or even successful acts of suicide [34]. In a classic study, Asberg et al. describe the correlation between the severity of the mental illness, the level of serotonin in the cerebrospinal fluid, and the chosen suicidal method, revealing that patients with severe psychiatric disorders associated with low serotonin choose to commit suicide more frequently and use the most violent methods [35].

In the literature, both forensic and psychiatric, it is reported that patients with mental disorders have a classic pattern of penetrating traumatic lesions of a self-inflicted nature. The lesional trajectory is oblique, starting from the angle of the mandible and continuing on the opposite side of the neck diagonally to the supraclavicular point, the incision being characterized by multiple unsuccessful and hesitant cuts. Successful suicide attempts by stabbing are characterized by a lesion, which cuts the carotid arteries and vital structures, which by bleeding cause death [36,37].

5. Conclusions

Complex cervical traumas, both closed and penetrating, are characterized by a variety of clinical manifestations, often heterogeneous and non-specific, being a multisystemic pathology, associated with high mortality and morbidity, becoming a condition with a continuous increase in incidence and prevalence. The vast majority of cervical injuries were caused by the self-inflicted mechanism, attempted suicide by hanging, followed by the accidental mechanism. Regarding the penetrating complex aero-digestive cervical traumas, they were mostly produced by stabbing both in aggression and self-inflicted circumstances. These elements, identified in our study, illustrate the aspects of a real public health problem. Predisposing factors with a predictive role in the production, especially of complex cervical

traumas by autolytic mechanism were the association of mental disorders with alcohol consumption. From a social and medical point of view, it is necessary to implement public health policies in terms of preventing the increase of alcohol consumption among the working-age population and a competent assessment in terms of the indication of institutionalized or outpatient treatment, prevention of repeated self-inflicted attempts, or tempting social reintegration. The strengths of the study consist in the number of cases that we studied, all the severe cases from all over the county of Moldova were referred here, being a tertiary hospital unit. Unfortunately, the limitation of the study consists in the fact that the patient with neurosurgical or vascular predominant lesions, we didn't have the opportunity to include them in the study due to the fact that, in our city, the neurosurgical unit is in a separate hospital, we included the ones who had the predominant lesion in ENT area.

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