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Complex suicides: 21 cases and a review of the literature

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Abstract

Background: The use of more than one potentially lethal method together and sequentially to complete suicide is called “complex suicide.” Complex suicides are divided into two groups: planned and unplanned. This study aimed to discuss with literature 21 complex suicide cases identified after a 2-year retrospective study.

Results: This study included 21 complex suicide cases. Eleven were classified as planned complex suicides, and 10 were labeled as unplanned complex suicides. The average age of all cases was 42.5 ± 17.7 (min: 19, max: 76) years. Suicide notes were present in six (28.5%) cases. Fifteen victims (71.4%) suffered from psychiatric diseases. Twelve victims ingested a toxic dose of medication, nine cases jumped from a height, eight cases used stabbing, six cases used hanging, two cases ingested a corrosive substance, two cases drowned, two cases inhaled a toxic gas, one case ingested cyanide, one case ingested insecticide, and one case used suffocation with a plastic bag. In two cases, three methods of suicide were used together. In the current study, “corrosive substance intake + cyanide intoxication” and “corrosive substance intake + jumping from a height” were defined for the first time and have not been previously described in the literature.

Conclusions: Complex suicides are highly likely to be potentially mistaken for murder. The cause of death in these cases can be determined with a comprehensive autopsy along with a detailed examination of the scene, statements of relatives, and eyewitnesses.

Keywords: Complex suicide, Unplanned complex suicide, Planned complex suicide, Forensic medicine, Autopsy

Background

The use of more than one potentially lethal method together and sequentially to complete suicide is called a “complex suicide” (Christin et al. 2018; Demirci et al. 2009; Kučerová Š et al. 2019; Simonit et al. 2018). Planning and using more than one method at the same time is called “planned complex suicide” or a “primary complex suicide” (Banchini et al. 2017; Germerott et al. 2010; Péliissier-Alicot et al. 2008; Straka and Novomesky 2013; Vidhate et al. 2016). Complex suicides in which other methods are used sequentially if the first method fails are called “unplanned complex suicide” or “secondary

complex suicide” (Ateriya et al. 2018; Banchini et al. 2017; Kučerová et al., 2019). Complex suicides constitute 1.5–5% of all suicide cases (Demirci et al. 2009; Petković et al. 2011; Racette and Sauvageau 2007; Straka and Novomesky 2013). In Turkey, Demirci et al. (2009) reported that 1.8% of 878 suicide cases in a 10-year period were complex suicides.

Most studies on complex suicides in the literature are case reports (Akçan et al. 2016; Ateriya et al. 2018; Bogdanović et al. 2019; Cascini et al. 2012; Christin et al. 2018; Dogan et al. 2014; Germerott et al. 2010; Kučerová et al., 2019; Péliissier-Alicot et al. 2008; Petković et al. 2011; Simonit et al. 2018; Straka and Novomesky 2013; Vadsinghe and Thilakarathne 2018; Vidhate et al. 2016) and few systematic studies currently exist available (Banchini et al. 2017; Barranco et al. 2019; Bohnert and Pollak 2004; Demirci et al. 2009; Kučerová et al. 2012; Racette

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and Sauvageau 2007). Complex suicides can often mislead researchers due to their combined use of multiple methods; in these cases, the distinction between a suicide and a homicide constitutes an important problem for forensic pathologists (Banchini et al. 2017). The distinction between complex suicide and homicide is important not only for forensic pathologists but also for the victim's family (Banchini et al. 2017). Therefore, the general characteristics of complex suicide victims should be well understood by forensic pathologists. Careful examination of the crime scene, detailed statements from the relatives and witnesses of the victims, evaluation of the victims' medical history, and a complete autopsy are required to differentiate between complex suicide and homicide (Bohnert 2005). This study aimed to discuss the characteristics of 21 complex suicide cases detected after a 2-year retrospective study with literature.

Methods

Criteria for case selection

In this study, the selection criterion for complex suicide cases was the use of more than one suicide method simultaneously or consecutively. Cutting the wrist(s) and drug overdoses were also accepted as an additional method.

Study group

Permission was obtained from the Bolu Abant İzzet Baysal University Clinical Research Ethics Committee with the decision dated 20/09/2020 and numbered 2020/216. The cases included in this study were obtained as a result of screening autopsy cases performed at the Istanbul Council of Forensic Medicine between 2014 and 2015.

Complete autopsy (histopathology, toxicological and radiological examination) was performed in all cases. The data used in the study were obtained from autopsy reports, witness statements, police inspection reports, suicide notes, and forensic investigation files.

According to the data obtained, if the person used one method at first and switched to the other method when this failed, it was considered as unplanned complex suicide. If the victim used more than one method at the same time, it was classified as planned complex suicide.

In 937 suicide cases for this period, 21 (2.2%) were considered as complex suicides (11 planned and 10 unplanned). The factors of age, gender, marital status, crime scene, suicide motivation, season and month of suicide, and the suicide methods were evaluated.

Statistical Package For Social Science SPSS, version 21.0 (IBM SPSS Statistics for Window, Version 21.0, Armonk, NY: IBM Corp.) statistics program was used for data analysis of the study. Descriptive statistics are presented with frequency, percentage, mean, standard

deviation (SD), minimum (min.), maximum (max.) values.

Results

Gender and age

In this study, 21 (2.2%) cases of complex suicide were detected from 937 suicide cases. Eleven (52.3%) cases were classified as planned complex suicides, while 10 (47.7%) cases were unplanned complex suicides. Of the 21 complex suicide cases, 17 (81%) were male, and four (19%) were female. The average age of the male cases was 39.7 ± 16.9 (min: 19, max: 76) years, and the mean age of female cases was 54.2 ± 18.3 (min: 36, max: 70) years. The average age of all cases was 42.5 ± 17.7 (min: 19, max: 76) years.

Scene

Eighteen cases (85.7%) committed suicide at home. Two cases committed suicide at sea, and one victim committed suicide in a vehicle.

Suicide notes and suicide attempts

Suicide notes were present in six (28.5%) cases. Five cases (23.8%) had a history of previous suicidal attempts.

Psychiatric disease and suicide motivation

Fifteen victims (71.4%) suffered from psychiatric diseases. Thirteen (61.9%) cases' motivation for suicide was psychiatric diseases, and three (14.3%) cases were due to financial problems.

Methods of suicide

In 21 cases, 44 total different suicide methods were used as follows: 12 cases used a toxic dose of medication, 9 cases jumped from a height, 8 cases stabbed themselves, 6 cases used hanging, 2 cases ingested corrosive substances, 2 cases drowned, 2 cases inhaled a toxic gas, 1 case ingested cyanide, 1 case ingested insecticide, and 1 case used a plastic bag for suffocation. Three methods were used together as the suicide method in 2 cases, while two methods were used together in 19 cases. The most commonly used methods were "drug overdose + hanging (n : 3, 14.2%)" and "stabbing + jumping from a height (n : 3, 14.2%)." One case that used three methods chose "drug overdose + wrist cutting + jumping from a height," while the other used "drug overdose + stabbing the chest + hanging" methods.

The characteristics of complex suicide victims are listed in Table 1.

Table 1 Characteristics of complex suicide cases

Case No	Gender	Age	Incident location	Suicide note	Past suicide attempt	Psychiatric disease	Suicide motive	Method of suicide	Cause of death	Planned - unplanned
1	M	33	Car	Yes	No	No	Financial	Ingested corrosive substance + ingested cyanide	Ingested corrosive substance + ingested cyanide	Planned
2	M	52	House-window	No	No	No	Familial problems	Ingested corrosive substance + jumping from height	Multiple organ injuries	Planned
3	M	61	House-room	No	No	Depression	Physical illness	Wrist cutting – drug overdose	Drug overdose	Unplanned
4	M	19	House-balcony	No	No	Psychosis	Psychiatric	Drug overdose + jumping from height	Multiple organ injuries	Unplanned
5	M	29	House-room	Yes	No	No	Financial	Wrist cutting – hanging	Hanging	Unplanned
6	M	25	House-room	Yes	No	Depression	Psychiatric	Drug overdose + stabbing the chest + hanging	Hanging	Planned
7	M	39	House-balcony	No	No	No	Familial problems	Wrist cutting, stabbing the abdominal + jumping from height	Multiple organ injuries	Unplanned
8	M	30	House-room	No	No	No	About lawsuit	Ethylchloride inhalation + plastic bag suffocation	Ethylchloride inhalation + plastic bag suffocation	Planned
9	M	76	House-balcony	No	Yes	Depression	Psychiatric	Drug overdose + jumping from height	Multiple organ injuries	Unplanned
10	M	34	Sea	No	No	Psychosis	Psychiatric	Drug overdose + drowning	Drowning	Planned
11	M	24	House-balcony	No	No	Psychosis	Psychiatric	Drug overdose + wrist cutting + jumping from height	Multiple organ injuries	Unplanned
12	M	70	House-balcony	No	Yes	Depression	Physical illness	Stabbing the popliteal fossa + jumping from height	Multiple organ injuries	Unplanned
13	M	53	House-kitchen	Yes	No	Psychosis	Psychiatric	Drug overdose + hanging	Hanging	Planned
14	F	36	Sea	No	Yes	Depression	Psychiatric	Drug overdose + drowning	Drowning	Planned
15	M	22	House-room	No	No	Anxiety disorder	Psychiatric	Wrist cutting + drug overdose	Drug overdose	Unplanned
16	M	34	House-balcony	No	Yes	Schizophrenia	Psychiatric	Stabbing the chest + jumping from height	Multiple organ injuries	Unplanned
17	M	41	House-balcony	No	No	Psychosis	Psychiatric	Hanging + jumping from height	Multiple organ injuries	Planned
18	M	34	House-kitchen	Yes	No	No	Financial	Drug overdose + butane inhalation	Drug overdose + butane inhalation	Planned
19	F	70	House-balcony	No	No	Depression	Psychiatric	Ingested insecticide + jumping from height	Multiple organ injuries	Unplanned
20	F	70	House-kitchen	No	No	Depression	Psychiatric	Drug overdose + hanging	Hanging	Planned

Table 1 (continued)

Case No	Gender	Age	Incident location	Suicide note	Past suicide attempt	Psychiatric disease	Suicide motive	Method of suicide	Cause of death	Planned - unplanned
21	F	41	House - room	Yes	Yes	Depression	Psychiatric	Drug overdose + hanging	Hanging	Planned

Discussion

Gender and age

In the literature, the majority of complex suicide cases were male (Banchini et al. 2017; Demirci et al. 2009; Racette and Sauvageau 2007). Barranco et al. (2019) stated that 84% of the complex suicide cases they presented were male. In this study, most cases were also male (81%). Men chose more violent methods of suicide than women, and their death rate was higher than women's; therefore, it was predictable that complex suicides would predominantly involve male victims.

Scene

In the literature, although complex suicides mostly occurred at home, they occurred in different areas (Kučerová et al., 2019; Pélissier-Alicot et al. 2008; Simonit et al. 2018; Vidhate et al. 2016). In Turkey, most of the complex suicide victims committed suicide at home (Demirci et al. 2009). In this study, 18 of the 21 cases (85.7%) committed suicide at home.

Suicide notes and suicide attempts

The suicide note is one of the most important pieces of evidence in making the distinction between a murder and a suicide in complex suicide deaths (Demirci et al. 2009; Kuwabara et al. 2006; Racette and Sauvageau 2007; Töro and Pollak 2009). Victims leave a suicide note in 20–50% of complex suicides (Demirci et al. 2009; Racette and Sauvageau 2007; Töro and Pollak 2009). In this study, suicide notes were present in 6 (28.5%) of 21 cases. A history of previous suicide attempts may also be considered a useful argument for a homicide-suicide distinction like the suicide note (Racette and Sauvageau 2007); 15–30% of victims of complex suicides have a history of previous suicide attempts (Demirci et al. 2009; Racette and Sauvageau 2007; Töro and Pollak 2009). In this study, five cases (23.8) had previously attempted suicide. In complex suicides, the existence of a previous suicide attempt appears to be less than the suicide note. However, it should not be forgotten that previous suicide attempts may have been overlooked if the victim's past was not completely revealed in the police investigation or if the family members did not want to talk about the victim's previous suicide attempts. For such cases, it will be significant to examine the hospital admission records in the distinction between suicide and homicide.

Psychiatric disease and suicide motivation

In complex suicides, many case reports include victims with psychiatric disorders including bipolar disorder, schizophrenia, depression, and depressive symptoms (Cascini et al. 2012; Christin et al. 2018; Dogan et al.

2014; Germerott et al., 2010; Pélissier-Alicot et al. 2008; Racette and Sauvageau, 2007; Simonit et al. 2018). Banchini et al. (2017) associated complex suicide cases with borderline personality disorder, major depression, bipolar disorder, and schizophrenia. Demirci et al. (2009) showed that 62.5% of complex suicide cases had been diagnosed with a psychiatric disease, and 50% of cases' suicide motivation source was psychiatric diseases. A history of a previous suicide attempt is one of the basic elements of complex suicide cases; in this study, 71.4% (n : 15) of the victims had a psychiatric disease, and 13 (61.9%) cases' suicide motives were a psychiatric disease, which was in accordance with the literature. Victims of complex suicide may be diagnosed with depression, schizophrenia, psychosis, bipolar disorder, anxiety disorders, and anti-social personality disorder (Banchini et al. 2017; Demirci et al. 2009; Simonit et al. 2018). In this study, there were diagnoses of depression (n : 8), schizophrenia (n : 1), psychosis (n : 5), and anxiety disorders (n : 1) in the complex suicide cases.

Methods of suicide

The most commonly used suicide method in this study was to take one or more drugs in lethal or toxic doses. In unplanned complex suicide cases, victims most often stab themselves or jump from a great height. In planned complex suicides, the victims most frequently preferred to take one or more drugs in lethal or toxic doses as a method of suicide. Bohnert (2005) claimed that the widespread use of hypnotics and other sedative drugs in planned suicides is one of the most common suicide methods in general, although the victim may also be using these drugs to reduce the pain of the second suicide method. Racette and Sauvageau (2007) noted that it would be difficult to distinguish whether the motivation for using hypnotic and other sedative drugs was to prevent the pain of the second suicide method or to actually kill the victim. To avoid this confusion, they suggested that these events should be classified as "drug-related complex suicides" and "drug-unrelated complex suicides." However, based on crime scene investigations and autopsy findings, Demirci et al. (2009) argued that drug intake in complex suicides can easily be demonstrated as for suicide purposes, and lethal and toxic drug overdoses should also be evaluated in these cases. In this study, we determined that 12 cases had taken one or more drugs at lethal or toxic doses for suicide by evaluating the crime scene investigation and autopsy findings. Studies conducted in Turkey have reported that the most commonly used suicide methods were hanging, the use of firearms, jumping from high places, and taking medications (Asirdizer et al. 2010; Enginyurt et al. 2014). In addition, emergency department studies demonstrated

that more than half of the poisonings that occurred for suicidal purposes involve the intake of drugs; the most commonly used drugs were antidepressants, antipsychotics, and analgesic medications (Avsarogullari et al. 2012; Kavalcı et al. 2012; Satar et al., 2009). Since drug overdoses are one common suicide method used in Turkey, this approach was included in this study as a method often used in complex suicides.

In planned complex suicides, two or more methods with high mortality rates are used at the same time to ensure death even if one method fails (Sanjeewa and Vidanapathirana 2017). In unplanned complex suicide, after the first suicide method is unsuccessful, other methods with a higher probability of death are attempted (Banchini et al. 2017; Demirci et al. 2009; Kučerová et al. 2019; Racette and Sauvageau 2007). Eleven of our 21 cases were evaluated as planned complex suicides, and 10 of them were labeled unplanned complex suicides. In the latter group, the victims often selected methods with a low risk of death before methods with a higher risk of death; it is thought that the reasons for switching from a low-risk method to a high-risk method include pain, suffering, and disappointment (Demirci et al. 2009). The highest number of separate suicide methods used at one time in the literature was six (Petković et al. 2011). In this current study, three distinct approaches were used together as a suicide method in 2 cases, while two methods were used together in 19 cases. The most commonly used methods were “drug overdose + hanging ($n: 3, 14.2\%$)” and “stabbing + jumping from a height ($n: 3, 14.2\%$).”

Bohnert (2005) reported that the most commonly used combinations in planned complex suicide cases were taking hypnotic and other drugs + hanging, taking hypnotic and other drugs + drowning, taking hypnotic and other drugs + plastic bag suffocation, hanging + firearm injury, and firearm injury + drowning in water. Barranco et al. (2019) stated that wrist cutting + hanging was the preferred combination in complex suicides. In the Demirci et al. study (2009), insecticide ingestion + shotgun injury and insecticide ingestion + jumping from a height were first choice combinations. Racette and Sauvageau (2007) reported that the most commonly preferred method in planned complex suicide was the combination of hanging + firearm injury. The literature describes frequently used conventional methods in complex suicide as follows: firearm injury, hanging, jumping from a height, drug overdose, insecticide ingestion, drowning in water, self-strangulation, cutting, and stabbing (Ateriya et al. 2018; Hejna et al. 2012; Kaliszan et al. 2013; Kučerová et al. 2019; Peyron et al. 2018; Racette and Sauvageau 2008; Simonit et al. 2018; Vadsinghe and Thilakarathne 2018; Yin and Heard 2012). There are also cases that used rare methods, such as a vehicle accident, the use of

electricity, foreign body ingestion, corrosive substance ingestion, eating plaster, self-burning, and nicotine patch use (Akçan et al. 2016; Bogdanović et al. 2019; Cascini et al. 2012; Christin et al. 2018; Dogan et al. 2014; Germerott et al. 2010; Karthik et al. 2013; Lardi et al. 2014; Péliissier-Alicot et al. 2008; Straka and Novomesky 2013; Vidhate et al. 2016;). In this study, the most commonly used methods were “medicine overdose + hanging ($n: 3, 14.2\%$)” and “stabbing + jumping from a height ($n: 3, 14.2\%$).”

A few cases of complex suicide have been related to the use of corrosive substances. Methods used in conjunction with corrosive substance intake include wrist cutting, stabbing, drug overdoses, and insecticide intoxication (Beltempo et al. 2015; Dogan et al. 2014; Petković et al. 2011; Vidhate et al. 2016). However, the combinations of “corrosive substance intake + jumping from a height” and “corrosive substance intake + cyanide intoxication” have not yet been described in the literature.

In the present study, one 33-year-old male victim was found dead in a car. A widespread erosive appearance and bleeding in the esophagus were detected upon autopsy. Hypochlorite was identified in a water bottle taken from the car at the scene, and a high amount of cyanide was found in the victim's blood. It was concluded that the man died due to hypochloric acid intake and cyanide intoxication, and the case was classified as a planned complex suicide.

A 52-year-old man committed suicide by jumping out the window of his second-floor home. During the crime scene investigation, an open bottle containing hypochlorite was found on the outer ledge of the window. The autopsy revealed general body trauma, widespread erosive changes and bleeding in the esophagus, and hypochloric acid in the stomach contents. It was concluded that the man died from hypochloric acid intake and jumping from a height; he was classified as a planned complex suicide because he ingested the hypochloric acid outside the window and then jumped. Thus, forensic pathologists should keep in mind that different combinations of suicide methods that have not been previously defined can be used together in complex suicide cases.

Differential diagnosis between complex suicide and murder

The suicide note has an indisputable place in the complex suicide-murder distinction. Lesions detected in the victims should be in localizations that may be performed themselves (Banchini et al., 2017). In this study, it was determined that all of the victims had lesions in localizations (wrist, abdomen, chest) that could be created by themselves. Penetrating stab wounds to the abdomen and chest usually do not cause visceral

injuries (Banchini et al., 2017, Simonit et al., 2018). In this study, the internal organs were not injured in penetrating stab wounds to the chest and abdomen. Multiple superficial incisions (hesitating incisions) on victims' bodies are an important finding in favor of suicide (Barranco et al. 2019). Hesitation cuts were detected in the vast majority of victims who used stabs in this study. In addition, none of the cases had defensive wounds. Defense wounds are a strong predictor of homicide (Banchini et al., 2017; Barranco et al. 2019). History of psychiatric illness is considered one of the fundamental factors for complex suicides. (Banchini et al., 2017, Simonit et al., 2018). In this study, the majority of the cases (71.4%) had a history of psychiatric illness.

Conclusions

Complex suicides are highly likely to be potentially mistaken for murder. Many different combinations of suicide methods can be used in complex suicides, including some that have not previously been described in the literature. Hence, forensic pathologists should not immediately assume that any case was a murder. The cause of death in these cases may be determined with a comprehensive autopsy along with a detailed examination of the scene, statements of relatives and eyewitnesses, a consideration of any history of prior suicide attempts, leaving a suicide note behind, any diagnosis of psychiatric illnesses and chronic illnesses, and an investigation of the victim's previous treatment history.

Abbreviations

SPSS: Statistical Package for Social Science program; min: Minimum; max: Maximum; SD: Standard deviation.

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Authors' contributions

EH: designed the study, reviewed the files and collected data, conducted the statistical analysis, and drafted the manuscript. BH: designed the study, reviewed the files and collected data, conducted the statistical analysis, and drafted the manuscript. İÇ: reviewed the files and collected data and drafted and reviewed the manuscript. SK: conceptualization and helped in drafting and reviewing the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

All the original data that was presented, mentioned, and analyzed in this research is available and accessible upon request in the medical forensic records and files at the Istanbul Council of Forensic Medicine. The medico-legal reports are not publicly available due to their private/legal nature but may be provided upon request for scientific inquiries or research.

Declarations

Ethics approval and consent to participate

Bolu Abant İzzet Baysal University Clinical Research Ethics Committee with the decision dated 20/09/2020 and numbered 2020/216.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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