JOMH
Journal of Men's Health

J. Mens. Health **2022**; 18(7): 158
https://doi.org/10.31083/j.jomh1807158

Review

Men's Suicide by Self-abdominal Cut and Disembowelment: A Literature Review and Analysis of Three Cases

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Submitted: 13 February 2022 Revised: 4 March 2022 Accepted: 30 March 2022 Published: 14 July 2022

Abstract

Introduction: Suicide by abdominal cut wounds and consequent disembowelment is a modality rarely described in the literature, with rates between 1.6% and 3%. The incidence is higher in men. This type of suicide might be so unusual as the abdominal injuries are not supposed to be related to immediate death (compared to the wrists or throat, which involves rapid bleeding, for example). Considering the infrequency of suicides by abdominal self-cutting, in such cases, the main hypothesis is a homicide, especially in those with multiple injuries or occurred in a complex setting. These cases require a detailed autopsy report with the analysis of the injuries and circumstances of death (e.g., farewell note, history of depression, previous suicide attempts, defense injuries, and signs of hesitation) to allow a differential diagnosis between suicide and homicide. This study aims to highlight the characteristics of suicides through self-cut wounding, focusing on those that determine a large abdominal opening and evisceration. **Methods**: The authors conducted the literature search using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, on PubMed and Scopus databases, using the following keywords: "(suicide) AND (abdominal stab wounds)", "(suicide) AND (abdominal sharp injuries)", "(suicide) AND (abdominal self-stabbing)", "(suicide) AND (abdominal cut wounds)". **Results**: 7 articles were included in the systematic review, for a total of 11 cases of suicide by abdominal self-cutting. Of these cases, 3 were women and 8 were men. **Conclusions**: The analysis of the external examination findings versus the crime scene results is essential to clarify if injuries are self-inflicted with suicidal intention. Suicide through a violent act can also be practiced by people who have no history of psychiatric conditions or other risk factors. Therefore, in cases of abdominal cut and evisceration with victims' survival time, the forensic pathologist has to consider that the deceased himself could cause modifications to the crime scene, turning it into a complicated suicide.

Keywords: sharp abdominal wounds; suicide; disembowelment; stab abdominal wounds; cut abdominal wounds; crime scene investigation; autopsy; self-cut suicide; suicidal behaviour; homicide

1. Introduction

Sharp abdominal wounds often characterize suicides and homicides, but rarely occur as accidental events [1]. Abdominal sharp wounds have been described in only 3% of suicides [2]. The abdomen is a self-infliction injury site in 30% of male suicide cases and in 13% of female cases [3]. Another case series reported the incidence of self-inflicted abdominal stab wounds to be 20% [4]. In several reported cases, self-stabbing is part of complex suicides that are characterized by injuries to other areas of the body [5]. Some studies show this is more frequent in men than women [6,7], especially between the ages of 40 and 60 years [8,9].

In complex suicides, the use of multiple methods of self-harm and the time elapsed between their occurrence and death can give rise to doubts about the dynamics of the suicide event. In forensic pathology, cut and stab wounds are two different types of sharp injuries. Cut wounds involve a wide area of the abdominal wall, resulting in an extended opening and, in some cases, evisceration. Stab wounds are deeper than they are wide. Although many stab wounds penetrate only the skin and subcutaneous tissues, this kind of injury is more often fatal as it involves vital deep structures [10]. This methodology is characterized by high lethality because it damages vital vessels, and by the intentionality of the act which means that it cannot be engaged "by mistake". The victim must find a suitable object and the strength to self-inflict a deep wound. Forensic pathologists encounter difficulty in distinguishing between abdominal self-inflicted injuries and those inflicted by others [11]. In the former cases, the victim may not die immediately and could modify elements of the crime scene. In many European countries, sharp injuries occur more frequently in homicides [12,13] than in suicides/accidental cases. Hence, forensic pathologists must pay close attention to determine the manner of death.

The aim of this study is to investigate the characteristics of suicide through self-cut wounding, with a focus on those involving a large abdominal opening and evisceration. This will be achieved by conducting a systematic review of the literature and by describing several typical cases. With these types of injuries, death may not be immediate and the victims often survive for a period after wounding. The au-

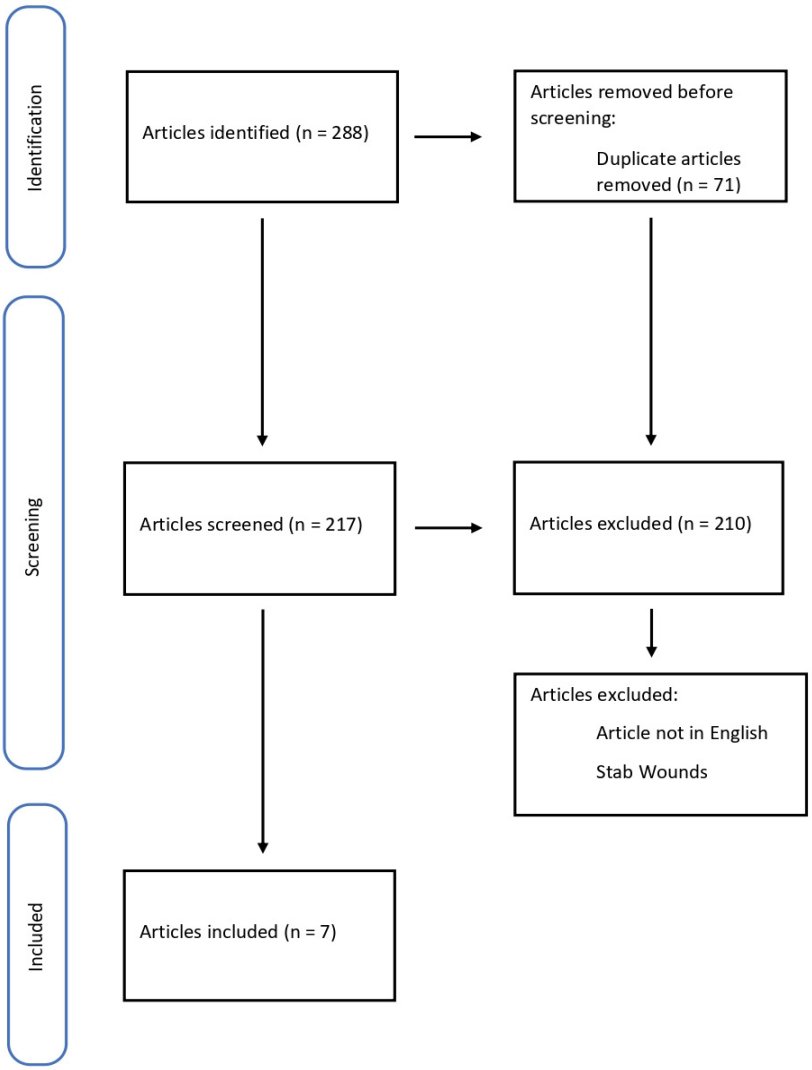

Fig. 1. Research methodology. Flow diagram illustrating studies included in and excluded from this systematic review.

thors seek to identify the distinctive features of self-inflicted wounds compared to those caused by third parties, thus providing helpful indicators for the forensic pathologist.

2. Materials and Methods

A systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [14]. The quality assessment of this study was evaluated using the Checklist for Systematic Reviews and Research Syntheses recommended by the Joanna Briggs Institute (JBI).

The literature search was carried out using the PubMed and Scopus databases. Articles published from 1967 to 2021 were searched for the key terms of: "(suicide) AND (abdominal stab wounds)", "(suicide) AND (abdominal sharp injuries)", "(suicide) AND (abdominal self-stabbing)", "(suicide) AND (abdominal cut wounds)".

A total of 288 articles were identified, with 71 duplicates removed. Following analysis of the remaining pertinent articles, 7 were included in the systematic review and 210 were excluded.

Inclusion criteria: Articles in English; cases involving only cut wounds of the abdominal wall and consequent disembowelment.

Exclusion criteria: Articles not in English; abstract only; cases involving stab wounds not cut abdominal wall wounds.

The methodology for the search strategy is presented in Fig. 1.

Articles whose title or abstract appeared to be relevant were independently reviewed and those that reported suicide by cutting of the abdominal wall and disembowelment were selected. References within these papers were also evaluated. The following information was extracted from case reports: age, sex, weapon, anamnesis, shape of abdominal wounds, presence of other lesions, affected organs, and

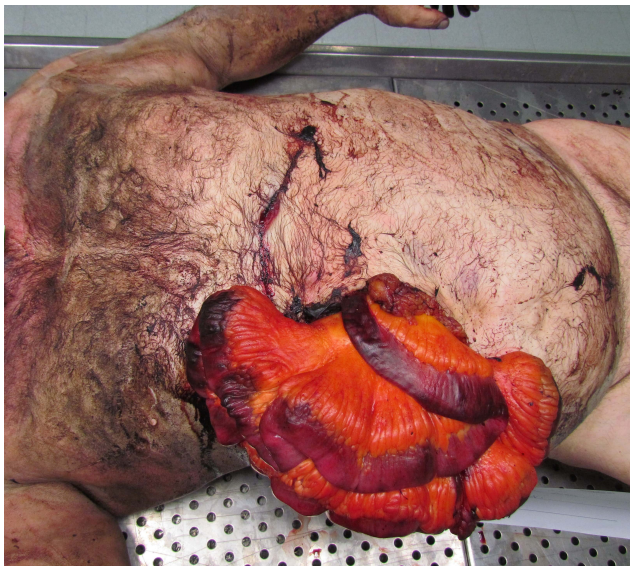

Fig. 2. Case 2. Large cut wound with protruding intestinal loops from the abdomen.

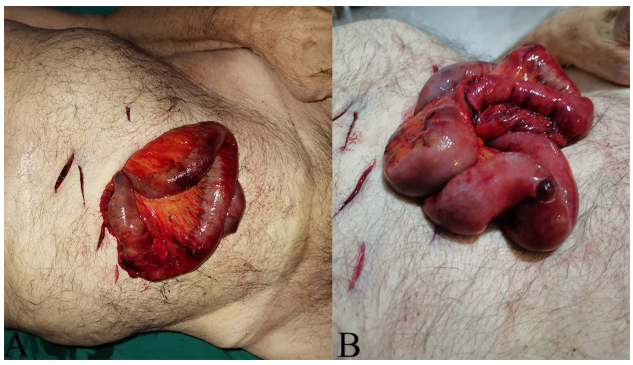

Fig. 3. Case 3. (A) Frontal view of deep and large wound and hesitation cuts. (B) Lateral view of evisceration of the intestinal loops.

estimated survival time. A letter of the alphabet indicates each case described in the case series.

3. Case Series

To further examine the peculiarity of abdominal self-cutting with evisceration and the non-immediate lethality of this kind of injury, three cases of disembowelment were investigated in the present study.

In the first case the victim was found in his apartment and sitting on his knees with his torso uncovered. In front of the corpse there was a large pool of blood and a dagger. The victim had only a single L-shaped wound with leaking and undamaged intestinal loops on the abdominal wall. External examination revealed the cut entry was on the left side of the wound and continued more superficially to the right. This feature was compatible with self-harm because the man was right-handed. The deceased had a history of depression at a subclinical stage due to divorce. There were several books on ancient religion and oriental philosophy in the apartment. The interest in oriental philosophy may explain the victim's position, which evoked the samurai code. Death should come slowly, as evidenced by the large pool of blood found in front of the victim.

The second case is a complex scenario where one man stabs another in the back during a fight. After a few hours, the stabber was found dead in his incompletely burned apartment. The corpse had a large cut wound with intestinal loops protruding from the abdomen (Fig. 2). The floor of the house had bloodstains spread across multiple rooms, leading the investigators to suspect a murder. The autopsy revealed soot on the mucous membranes of the upper airways and no other lesions. Analysis of the blood pattern and study of the wound made it possible to prove the victim stabbed himself and walked around the apartment. Despite the disembowelment, he was able to set fire in several places. His death was the result of hemorrhagic shock from exsanguination in combination with carbon monoxide intoxication.

The third case was an 85-year-old man affected by painful, gouty arthritis. He cut himself with a kitchen knife while sitting on the water closet and after raising his shirt. The knife was still in the abdomen at the time of arrival of the pathologist. It was extracted during the external examination, revealing a deep and large wound with evisceration of the intestinal loops (Fig. 3A,B). Several linear and superficial cut injuries were present around the wound, suggestive of hesitation cuts. An intestinal loop presented a linear, non-perforating wound, while the central axis of the cut wound was horizontal. Results from the crime scene investigation and the morphological characteristics of the wounds lead to the diagnosis of suicide, in agreement with other findings reported in the literature.

4. Results

The results are summarized in Table 1 (Ref. [15–20]).

5. Discussion

According to several authors, the modality of suicide by abdominal self-stabbing is rarely described in the literature, with an incidence of between 1.6% to 3% of all suicides [15]. Some studies have shown this form of suicide is more frequent in men (28.6%, n = 1035) than in women (12.5%, n = 216) [6], especially between the ages of 40 to 60 years [8,9]. Our systematic review confirms the literature data. Suicide by evisceration is a particular type of abdominal self-stabbing [7] carried out more frequently by men. Our review shows that of the 11 cases of disembowelment reported, only 3 were by women. This type of suicide could be very rare because the abdominal injuries may not lead to immediate death, in contrast to cutting of the wrists or throat for example which lead to rapid bleeding [21].

Table 1. Summary of the reviewed literature.

Case report	Age	Sex	Weapon	Anamnesis	Shape of abdominalwounds	Presence of other lesions	Affected organs	Survival time
Mugadlimath *et al*. 2018 [15]	34	Male	Dismantled razor blade		Horizontally placed incised penetrating wound over the abdomen in left umbilical area with complete exteriorisation of the bowel	Multiple superficial, parallel, and horizontally placed incised wounds (hesitation cuts) extending up to the right hypochondriac region of the abdomen	Transection of jejunum, ileum, transverse colon and gastric vessels	Almost 12 hours
Judea-Pusta *et al*. 2019 [16]	(a) 42	(a) Male	(a) Kitchen knife	(a) Chronic alcoholic disorder	(a) Penetrating linear wound, through which the intestinal folds, colon, jejunum, ileum and a part of the mesentery were exposed	(a) Multiple stab wounds on the anterior abdominal wall	(a) Intestine, mesentery, blood vessels	(a) -
	(b) 79	(b) Female	(b) Knife	(b) Senile dementia, depression, peritoneal adherence syndrome	(b) Linear postoperative xipho-pubian wound	(b) Para umbilical sutured stab wound	(b) Transverse colon, mesocolon, gastrocolic ligament, right gastroepiploic artery	(b) Few hours
	(c) 62	(c) Male	(c) Kitchen knife	(c) Bronchial asthma, diabetes, depressive syndrome	(c) Linear postoperative xipho-pubian wound	(c) Two horizontal parallel wounds on the left hypochondriac region	(c) Liver, epiploon, transversal mesocolon, blood vessels	(c) 16 days
Di Nunno *et al*. 2001 [17]	(a) 36	(a) Male	(a) Barber's razor	(a) Schizophrenia	(a) Horizontal wound below the navel with intestinal loops protruding from it	(a) NR	(a) -	(a) -
	(b) 57	(b) Male	(b) Knife	(b) NR	(b) L-shaped wound	(b) Two parallel cut wounds on the undersurface of both wrists	(b) -	(b) -
	(c) 79	(c) Female	(c) Knife	(c) Depression and suicide attempt 2 years earlier by a drug overdose	(c) Extensive cut wound	(c) Another more superficial cut on the abdomen	(c) Mesentery and bowel ansae	(c) Few minutes
	(d) 75	(d) Female	(d) NR	(d) Maniac – depressive psychosis and suicide attempt 4 years earlier	(d) Horizontal wound from which intestinal loops protruded	(d) Trial cuts on the neck; three parallel superficial wounds on the thorax; a superficial wound on the left hand; a superficial wound above the left knee; a deep wound on the right foot	(d) Mesentery, loop walls, omental adipose tissue	(d) -
Moriani *et al*. 1996 [18]	50	Male	Japanese Knife	Depression	Horizontal cut 7 cm above the transverse line at the level of the navel with a portion of the intestine protruding from it	Six stab wounds on the right side of the neck	-	-
Dawood 2011 [19]	42	Male	One-bladed knife	Under psychiatric treatment for psychological and psychosomatic troubles (anxiety, insomnia, headache, indigestion, throat, stomach, and colonic pains)	Transverse sharp cut wound 6 cm long in the abdominal wall 5 cm to the left of the umbilicus from which intestinal loops protruded	Cut throat on the right side of the neck; Transverse non penetrating sharp cut wound to the right side of the abdominal wall	-	-
Skowronek *et al*. 2017 [20]	78	Male	Kitchen knife	Disoriented and agitated, problems with speech and hearing	Irregularly-shaped xipho-pubian wound	Multiple parallel shallow wounds on the front area of the neck	Jejunum was cut out slightly below the duodenum	-

The most famous suicide modality by abdominal self-cutting is hara-kiri [16]. This type of suicide is part of the bushido honor code of the Japanese samurai, but nowadays is extremely rare even in Japan [22]. It is also observed in non-Japanese people, typically psychiatric patients or alcohol abusers [23]. In psychiatric patients, self-cutting usually affects males over 50 years old with mood disorders [24]. Depression disorder is the most common disease, followed by schizophrenia [25]. In some cases, the presence of a psychiatric disorder was not apparent [26], although the choice to commit a painful suicide may underlie an undiagnosed disorder [27]. In other cases, suicide was not preceded by alcohol consumption, even though most studies have confirmed an association between suicide and alcohol intoxication [28]. Proper evaluation of psychiatric patients is essential in order to identify those at risk of suicide. Among the many tools available, the Patient Health Questionnaire 9 (PHQ-9) [29] is used to monitor the severity of depressive symptoms, the Beck's Scale (SSI) [30] for suicidal ideation, and the Columbia–Suicide Severity Rating Scale (C-SSRS) [31] for quantifying the severity of suicidal ideation and behavior. Proper assessment of psychiatric disorders can help to facilitate a differential diagnosis between homicide and suicide.

In view of the rarity of suicide by abdominal self-cutting, the main hypothesis in such cases is homicide, especially when there are multiple injuries or there is a complex setting. These cases require a detailed autopsy report with thorough analysis of the injuries and circumstances of death (e.g., farewell note, history of depression, previous suicide attempts, defensive injuries, signs of hesitation) to allow a differential diagnosis between suicide and homicide [25,32].

In the cases described in the literature, the findings suggestive of suicide are wounds on parts of the body that are not covered by clothes, and the presence of cuts or superficial punctures around the larger wound or on the wrists [33].

Self-inflicted abdominal cut wounds, with or without evisceration, are often non-lethal and cause only abdominal or retroperitoneal injuries [34]. Non-immediate lethality is a significant aspect for forensic pathologists. While still alive the victim can carry out voluntary or involuntary actions, thus concealing the crime scene [35] and resulting in pathological patterns that can be confused as suicide or homicide. It can therefore often be difficult to distinguish between self-inflicted and assault wounds to the abdomen [17].

In cases of suicides by abdominal cut, organ lesions are present in 44.4% to 60–66% of cases [7,36], while hesitation injuries are also found in about 70% of suicide cases [37]. Hesitation wounds are highly suggestive of suicide [38,39]. Krywanczyk *et al*. [12] reported multiple stab wounds in 10% of homicides and 0% of suicides, and multiple incisional wounds in 60% of suicides but only 10% of homicides [9]. The typical location of self-inflicted sharp wounds is the upper abdomen [40]. Brunel *et al*. [41] reported that wounds with a horizontal axis were typical of suicides.

In second case, none of the risk factors described in the literature were present. Simonit *et al*. [42] described the presence of psychiatric co-morbidities or alcoholism in subjects who commit complex suicides with fire. Complex suicides represent 1.5–5% of all suicides reported in the literature [43,44]. To our knowledge, self-cutting suicides associated with local fire have not been described in the literature. However, there is a possibility that victims try to conceal their suicide in the last minutes of life, possibly because they change their mind or for other reasons such as religion or life insurance [44]. In this case, the differential diagnosis between suicide and homicide was complicated because of the combined death mechanism [45–47], thus highlighting the need to carry out a careful investigation of the crime scene and autopsy.

The three cases described above are forensically interesting because the victims did not have any of the risk factors previously described in people who committed suicide through abdominal self-cutting. None of the deceased had ever previously attempted suicide or had a history of alcoholism, while only the first case presented a history of depression. In agreement with the literature, the self-stabbing area was unclothed [18,19,47]. Two of the suicide cases were younger than the average age described in the literature [20].

The second case presented as a complex crime scene, with destruction of the scene by fire and the presence of bloodstains in the apartment away from the body. These characteristics suggest that someone else intervened on the scene and started the fire after engaging in a fight. Only in the third case were there hesitation wounds around the larger wound, as well as a lesion on an intestinal loop.

In all three cases, the location and central axis of the wound concur with findings previously reported in the literature. Moreover, the suicide modality was atypical for people with no cultural or religious reasons to use this method of suicide [48,49].

6. Conclusions

Suicide by abdominal self-cutting and evisceration is rare and is mostly carried out by men.

In our view and from the conclusions of published studies, careful analysis of external examination findings and their correlation with crime scene results is critical in establishing that the injuries were self-inflicted with suicidal intention. Therefore, in cases of abdominal cut and evisceration with a short period of survival time, the forensic pathologist should consider that the deceased may have altered the crime scene before death, thus turning it into a complicated suicide. The lack of a specific history of mental disorder and other typical signs of suicide should not

exclude the possibility that a subject may be in an emotional state that makes them capable of committing a self-destructive act. In the case of complex suicides, a major challenge is the differential diagnosis between suicide and homicide. Some of the features that indicate suicide are a single large cut to the abdomen with a few close "hesitancy" wounds and in a body area without clothing. In order to determine the cause, the forensic examiner should then carefully study the circumstances and any related injuries.

7. Limitations and Strengths

This review is the first attempt to identify and describe all the features required to make a diagnosis of abdominal self-cutting suicide. However, this suicide methodology is rare and only seven cases were identified from a systematic review of the literature.

Author Contributions

MAB, NDF and GG reviewed the literature. SDS and RB wrote the manuscript. LC supervised and edited. SV revised the language. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

All procedures performed in the study were in accordance with the ethical standards of the institution and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The approval number from the Ethical Standards is 067. Informed consent was obtained from the relatives.

Acknowledgment

Thanks to all the peer reviewers for their opinions and suggestions. Thanks to our cat, Formalina, for taking care of us!

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest. LC is serving as one of the Guest editors of this journal. We declare that LC had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to AT.

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