

THE DEADLY DUODENAL ULCER, THE SUDDEN DEATH YOU DO NOT EXPECT: TWO CASES IN A ROW

Michele Telegrafo ¹, Maurizio Mastrapasqua ¹, Federica Misceo ¹, Simona Nicoli ¹, Lorenzo Polo ², Aldo Di Fazio ³, Biagio Solarino ¹, Davide Ferorelli ¹

1. Interdisciplinary Department of Medicine (DIM), Section of Legal Medicine. University of Bari "Aldo Moro". Bari, Italy.
2. Scientific Manager "Brain SCH". Pavia, Italy.
3. "San Carlo" Potenza Hospital, Section of Legal Medicine. Potenza, Italy.

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ABSTRACT

Two cases in a row demonstrate the importance of autopsy in the investigation of the cause of death, even when circumstantial information and preliminary examinations suggest potentially lethal pathology, such as sub-arachnoidal or intracranial haemorrhage, arteriovenous malformation (AVM) rupture, sudden cardiac death, aortic dissection, pulmonary embolism, intoxication, etc. These two cases show how every sudden death needs further investigation to figure out what the real cause is because there are so many fatal pathologies that can cause it. Indeed, the duodenal ulcer detected in these cases cannot be diagnosed without an autopsy. External examination only may be insufficient or too generic being able, if not followed by an autopsy, to direct towards incorrect causes of death.

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1. Introduction

These two case reports demonstrate the importance of autopsy in the investigation of the cause of death, even when circumstantial information and preliminary examinations suggest a potentially lethal pathology, such as sub-arachnoidal or intracranial haemorrhage, arteriovenous malformation (AVM) rupture, sudden cardiac death, aortic dissection, pulmonary embolism or intoxication, etc.

In these two cases, the court had ordered an autopsy to define with certainty the cause of death of a middle-aged man who died suddenly and a middle-aged woman who had previously alerted the emergency service and was then transferred to the emergency room.

Unexpectedly, in both of these two cases the death was caused by a duodenal ulcer.

The prevalence of duodenal ulcers is estimated in about 5 to 15% of the Western population (1).

H. pylori infection presents significant comorbidity for the development of duodenal ulcer (2).

Prostaglandins play a crucial role in developing the protective mucosa in the gastrointestinal tract, including gastric and small intestine mucosa being one of the primary predisposing pathophysiologic factors for the development of duodenal ulcers (3).

Most patients with peptic ulcer disease, up to 70%, are asymptomatic and location of ulcer can be differentiated based on symptoms (4).

The prognosis of duodenal ulcers is variable, and three complications are mainly associated with duodenal ulcers: bleeding, perforation, and obstruction. These complications can also lead to death, which can sometimes occur suddenly (5, 6).

2. Case report one

A 56-year-old man was found dead in the laundry room located on the first floor of his house. The room appeared in disorder, but the police did not find any signs of forced entry. The dead body lay on its right side over a camp bed, near a sink, that had blood stains on the outer edge. On the floor, in correspondence with the position of the head, there was a collection of percolated blood likely coming from the nostrils.

The body showed no signs of struggle, but his clothes were stained with blood and no traces of blood were observed on the man's legs or his back.

The afternoon before his death the man accessed the emergency room for a fall with suspected head trauma. The tests carried out at the Hospital for the reason of the trauma were completely negative and therefore the patient had been discharged and had not showed any other symptoms.

The prosecutor requested an autopsy because after a preliminary external examination, there were no signs of trauma or violence that would have caused death, so all assumptions of sudden death in a middle-aged man were possible.

The dissection was performed and the preliminary inspection revealed no significant element either at cranial-encephalic examination or thoracic examination.

These findings, therefore, allowed the authors to exclude many of the causes of sudden death such as sub-arachnoidal or intracranial haemorrhage, AVM rupture, macroscopic heart disease, aortic dissection, and pulmonary embolism.

Instead, the inspection of the abdominal cavity showed a marked dark colour of the intestinal loops (Figure 1).

been considered statistically valuable when the P-value was <0.05.



Figure 1. Inspection of the abdominal cavity

The next opening of the digestive system, starting from the esophagus, showed in the stomach the presence of a very large clot, weighing about 800 g, that once removed exposed a gastric mucosa diffusely hyperaemic, with no macroscopic lesions (Figure 2).



Figure 2. Opening of the digestive system, starting from the esophagus.

Once the duodenum was isolated, on the posterior portion of the bulb, near the head of the pancreas, the authors observed the presence of a large continuous solution, located about 2 cm distally from the pylorus. The area was a big circular and crateriform ulcer, with a diameter of about 3.2 cm and a depth of about 1 cm (Figure 3).

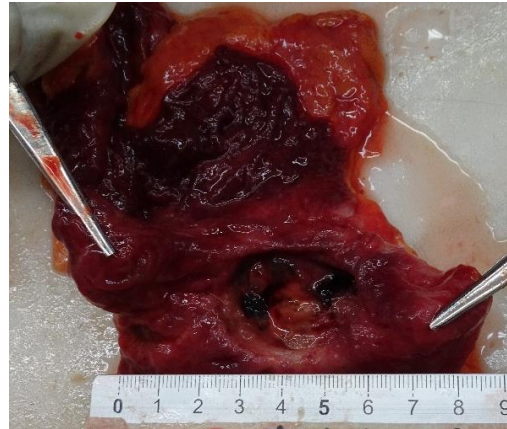


Figure 3. Inspection of the duodenum.

The remaining bowel showed the presence of partially digested blackish blood, along the entire digestive tract, up to the terminal portion of the descending colon. These findings explained the dark color of the intestinal loops observed during the inspection of the abdominal cavity (Figure 4).



Figure 4. Inspection of the remaining bowel.

At the end of the autopsy, it was determined that the sudden death of the patient was caused by haemorrhagic shock due to a silent perforated ulcer, refuting the initial and most common hypotheses of sudden death.

3. Case report two

A 47-year-old was found unconscious at home by her mother, who alerted the emergency service. Due to the onset of cardiac arrest, the emergency personnel initiated cardiopulmonary resuscitation, with a subsequent spontaneous recovery of the circulation.

In consideration of the critical clinical state, the patient was transported to the Emergency Department. From the few anamnestic notes reported, the authors learned that the patient was addicted to the use of drugs.

A CT scan of the chest, abdomen, skull, and entire spine was performed.

From these imaging tests, which were not completed due to the occurrence of new circulatory arrest, emerged the presence of a multi-fragmentary displaced fracture of L2 and a fracture of the right transverse process of L1.

Transported back to the shock room for cardio-circulatory arrest the resuscitation manoeuvres started again without any success. Also in this case, an autopsy was requested because, after a preliminary external examination, there were no signs of trauma or violence that could justify the death.

The dissection was performed and it revealed no significant element at the cranial-encephalic and thoracic examination, except for a relevant pallor of the organs, confirming what was highlighted in the CT exam.

Exploration of the abdominal cavity, in this case, showed a faint purplish discoloration of the walls of the abdominal loops (Figure 5).



Figure 5. Exploration of the abdominal cavity.

The next opening of the digestive system showed solid brownish material in the esophagus and an area of reddish color in its middle third (Figure 6). The stomach contains about 300 ml of brownish liquid mixed with partially digested material. Its mucosa appears normal except for the presence of small ulcer-like lesions in the lesser curvature. Once the duodenum was opened and explored, the authors noticed a circular ulcerative-type lesion with a diameter of 2.5 cm and about 1 cm deep, covered from amorphous, soft, reddish-coloured material, with the characteristics of a clot, located in the proximal portion of the duodenum, close to the pylorus in correspondence with its posterior wall (Figure 7, 8). The lumen of the colon contained digested blood material mixed with clots (Figure 9).



Figure 6. Opening of the digestive system, starting from the esophagus.

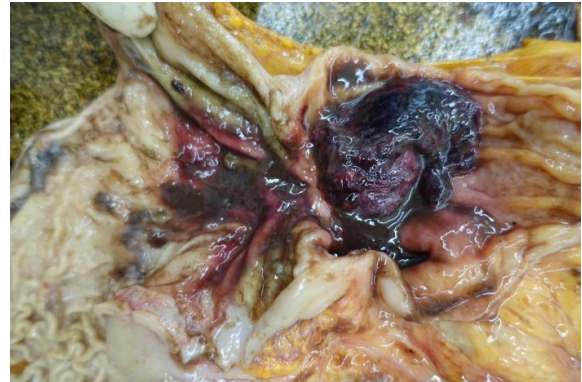


Figure 7. Opening of the digestive system, duodenum.



Figure 8. Opening of the digestive system, posterior duodenum.



Figure 9. Inspection of the colon lumen.

4. Discussion

Sudden death is defined as "a natural and unexpected fatal event that occurs within an hour of the onset of symptoms in an apparently healthy subject or whose disease was not so severe as to predict a sudden outcome"(7). This short interval of one hour is difficult to apply in forensic pathology because the circumstances of death are often unknown. Witnesses are not always present, especially when the death occurs at night. For this reason, forensic pathology studies use the WHO (World Health Organization) definition that identifies the time interval in 24 hours. (8)

Multiple causes of sudden death of different etiopathogenesis are reported in the literature.

The most frequent is Sudden cardiac death (SCD) defined as a sudden and unexpected natural death of cardiac etiology, in individuals without known potentially fatal pathologies or in individuals with pre-existing chronic heart disease, in whom, however, death arrives unexpectedly both in terms of timing and modality. (9,10) With advancing median age, the incidence of sudden death increases, mainly due to coronary atherosclerosis. (11) The most frequently documented arrhythmia is ventricular fibrillation (75-80%), while bradyarrhythmias contribute to sudden cardiac death to a lesser extent. In 5-10% of cases, sudden cardiac death occurs in the absence of coronary artery disease and heart failure. (12) Therefore, SCD is represented frequently in forensic autopsy practice, whereupon pathological findings in the heart can explain acute death. These pathological changes may not only include myocardial infarction, coronary thrombosis, or all forms of myocarditis/endocarditis but also rare diseases, especially in younger people, such as hereditary structural or arrhythmogenic anomalies, lesions of the cardiac conduction system, or primary cardiac cancers. (13)

There are also cardiovascular causes of sudden death beyond the heart, such as aortic dissection. Dissection may be in the pericardial sac, or less frequently at the level of the thoracic aorta causing bleeding in the pleural cavities, or again at the level of the abdominal aorta. (14)

Another well-known cause in the literature of sudden death of a cardiovascular nature is pulmonary thromboembolism, this is more frequent after the fifth decade of life and generally in the two weeks following a trauma. (15)

Although cardiovascular causes are the most common there are numerous other causes of sudden death. Among these, we remember those of a neurological nature such as the rupture of an AVM or a subarachnoid/intracranial haemorrhage; causes of a pulmonary nature such as pneumothorax or severe asthmatic episodes; causes of a gastrointestinal nature such as rupture of esophageal varices, Acute bleeding from perforated peptic ulcer, obstruction or intestinal perforation. Finally, there are also possible intoxications such as causes of sudden death, among these we remember overdoses of abused substances or drugs. (16)

In these case reports, the autopsy was determinant and showed a non-common cause of sudden death: the duodenal ulcer.

The term ulcer in medicine stands for a mucosa's erosion that penetrates the muscular layer of a cave organ (17). The "peptic ulcer" is a more complex definition of a lesion that occurs in the gastrointestinal mucosa, due to different causes (18). Through the years, different studies have shown how the erosion could be realized by a dysregulation of the functional balance between anatomic tissue constitution, protective secretion, and acid gastrin production (19,20). In this scenario different clinical features should be considered in the evaluation of every single patient: familiarity, pharmacological anamnesis, smoking habits, alcoholic consumption, and stress level. The diagnosis of peptic ulcer nowadays is made after a clinical suspicion based on the complete anamnesis, clinical evaluation, and instrumental examination (like EGDS) to confirm the clinical suspect and to start therapy (21). The pharmacological gestion of this disease has meant that the condition is now underrated, maybe because of the effectiveness of domiciliary oral therapy, different from the past when the only therapeutic option was surgery. (22,23).

The condition is no longer evolutive and dangerous because of misdiagnosis of a peptic ulcer or the absence of patient compliance which could induce the clinical manifestation of a series of potentially life-threatening complications. The most frightening one is the acute digestive bleeding (24): In 45% of cases the event is caused by a peptic ulcer, due to erosion of gastric or duodenal arteries, plus rarely of branches of the gastropiploic artery, or the pancreatic-duodenal artery.

In this case report the patient suffered from an unknown duodenal ulcer that had caused the sudden death, initially correlated to heart failure, and after an ER access in which he had not shown any clinical or instrumental sign of blood loss.

This kind of peptic ulcer is more frequent than gastric one, tends to affect male adult patients, and is located on the anterior wall of the organ (25). It can be asymptomatic (26), but generally, its presence is characterized by the appearance of dull-type abdominal pain.

In this case, it was a silent killer.

5. Conclusions

This case report shows how every sudden death needs further investigation to reveal the real cause and exclude the many other fatal pathologies capable of causing sudden death. Diseases of frequent occurrence in the population, such as the duodenal ulcer in this case, which are potentially fatal, cannot be diagnosed without an autopsy.

External examination, in cases such as the one described, may be insufficient or too generic and may result on insufficient and hasty conclusions such as nonspecific cardiac death.

Only autopsy can resolve the issue, highlight pathological images that would otherwise remain hidden and help forensic pathologists conduct statistical studies on such infrequent causes of death.

Every sudden death should, in general, provoke a medical-legal investigation, but we believe that an autopsy should always be performed especially since the widespread use of telemedicine results in fewer hospital visits with a consequence of less health documentation available to the forensic pathologist (27).

References

1. Cave DR. Transmission and Epidemiology of *Helicobacter pylori*. *Am J Med*. 1996 May;100:12S-18S.
2. Pounder RE, Ng D. The prevalence of *Helicobacter pylori* infection in different countries. *Aliment Pharmacol Ther*. 1995;9 Suppl 2:33-9.
3. Peskar BM. Role of cyclooxygenase isoforms in gastric mucosal defence. *Journal of Physiology-Paris*. 2001 Jan;95(1-6):3-9.
4. Wilcox CM, Clark WS. Features associated with painless peptic ulcer bleeding. *Am J Gastroenterol*. 1997 Aug;92(8):1289-92.
5. Behrman SW. Management of Complicated Peptic Ulcer Disease. *Archives of Surgery*. 2005 Feb 1;140(2):201.
6. Lau JYW, Sung JY, Lam Y hoi, Chan ACW, Ng EKW, Lee DWH, et al. Endoscopic Retreatment Compared with Surgery in Patients with Recurrent Bleeding after Initial Endoscopic Control of Bleeding Ulcers. *New England Journal of Medicine*. 1999 Mar 11;340(10):751-6.
7. Naneix AL, Périer MC, Beganton F, Jouven X, Lorin de la Grandmaison G. Sudden adult death: An autopsy series of 534 cases with gender and control comparison. *J Forensic Leg Med*. 2015 May;32:10-5.
8. Cohle SD, Sampson BA. The negative autopsy: Sudden cardiac death or other? *Cardiovascular Pathology*. 2001 Sep;10(5):219-22.
9. Myerburg RJ. Sudden Cardiac Death: Exploring the Limits of Our Knowledge. *J Cardiovasc Electrophysiol*. 2001 Mar;12(3):369-81.

10. Virmani R, Burke AP, Farb A. Sudden cardiac death. *Cardiovascular Pathology*. 2001 Sep;10(5):211–8.
11. Burke AP, Farb A, Liang Y hui, Smialek J, Virmani R. Effect of Hypertension and Cardiac Hypertrophy on Coronary Artery Morphology in Sudden Cardiac Death. *Circulation*. 1996 Dec 15;94(12):3138–45.
12. Myerburg RJ. Sudden Cardiac Death: Epidemiology, Transient Risk, and Intervention Assessment. *Ann Intern Med*. 1993 Dec 15;119(12):1187.
13. Markwerth P, Bajanowski T, Tzimas I, Dettmeyer R. Sudden cardiac death—update. *Int J Legal Med*. 2021 Mar 21;135(2):483–95.
14. Sakalihan N, Limet R, Defawe O. Abdominal aortic aneurysm. *The Lancet*. 2005 Apr;365(9470):1577–89.
15. Phillippe HM. Overview of venous thromboembolism. *Am J Manag Care*. 2017 Dec;23(20 Suppl):S376–82.
16. Langlois NEI. Sudden adult death. *Forensic Sci Med Pathol*. 2009 Sep 18;5(3):210–32.
17. Wolf S. Peptic ulcer. *Psychosomatics*. 1982 Nov 1;23(11):1101–5.
18. Yeomans ND, Naesdal J. Systematic review: ulcer definition in NSAID ulcer prevention trials. *Aliment Pharmacol Ther*. 2008 Jan 11;27(6):465–72.
19. Scally B, Emberson JR, Spata E, Reith C, Davies K, Halls H, et al. Effects of gastroprotectant drugs for the prevention and treatment of peptic ulcer disease and its complications: a meta-analysis of randomised trials. *Lancet Gastroenterol Hepatol*. 2018 Apr;3(4):231–41.
20. Sverdén E, Agréus L, Dunn JM, Lagergren J. Peptic ulcer disease. *BMJ*. 2019 Oct 2;15495.
21. Satoh K, Yoshino J, Akamatsu T, Itoh T, Kato M, Kamada T, et al. Evidence-based clinical practice guidelines for peptic ulcer disease 2015. *J Gastroenterol*. 2016 Mar 15;51(3):177–94.
22. Garza-González E. A review of *Helicobacter pylori* diagnosis, treatment, and methods to detect eradication. *World J Gastroenterol*. 2014;20(6):1438.
23. Troland D, Stanley A. Endotherapy of Peptic Ulcer Bleeding. *Gastrointest Endosc Clin N Am*. 2018 Jul;28(3):277–89.
24. Loffroy R. Management of duodenal ulcer bleeding resistant to endoscopy: Surgery is dead! *World J Gastroenterol*. 2013;19(7):1150.
25. Susan Stranding. *Le basi anatomiche per la pratica clinica*. 40th ed. 2017. 1119–1122 p.
26. Kavitt RT, Lipowska AM, Anyane-Yeboah A, Gralnek IM. Diagnosis and Treatment of Peptic Ulcer Disease. *Am J Med*. 2019 Apr;132(4):447–56.
27. Ferorelli D, Moretti L, Benevento M, Mastrapasqua M, Telegrafo M, Solarino B, et al. Digital Health Care, Telemedicine, and Medicolegal Issues in Orthopedics: A Review. *Int J Environ Res Public Health*. 2022 Nov 25;19(23):15653.