

Application of blood clotting in blood morphology analysis of homicide scene

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Abstract: The morphology analysis of blood in crime scene through the study and analysis of the size, shape and distribution of blood, to judge the nature of the event and the process of the event, blood clotting has its own characteristics. Blood has the characteristics of mobility and easy infiltration in liquid state. After blood clotting, blood clots at the edge of the object to form marginal blood, showing a blank area below the object. In the case that the object soaked with blood is not completely coagulated, moving will make the blood stain appear drag marks, which can judge the moving time of some stained blood object. After coagulation, the blood lost the characteristic of easy to stain other objects, so the time of contact between blood and the object can often be analyzed. The coagulation characteristics of blood stains can be applied to the analysis and reconstruction of murder cases.

1. Introduction

The size, shape and distribution of blood stains at the crime scene are studied and analyzed to determine the nature of the event and the occurrence process of the event. The coagulation characteristics of blood stains can also be used in the field analysis and reconstruction.

1.1 Analysis of blood morphology in crime scene investigation.

Crime scene investigation is an activity in which investigators use scientific and technological means to conduct inquest and examination of the places, articles, persons and corpses related to crimes. [1] the objects of scene investigation are varied according to the specific scene. Among them, blood stain is one of the common traces at the crime scene, especially at the scene of murder. Blood stain, as a trace of criminal act, reflects to some extent the criminal's behavior and activity process at the crime scene. In 1969, Herbert McDonough, an American court scientist, began to study the pattern of blood stain at the crime scene. At present, the pattern analysis of blood stain has become a systematic subject. The morphology analysis of blood in crime scene is a science to judge the nature and process of blood by studying and analyzing the size, shape and distribution of blood. [2] When the investigators inspect and extract the bloodstains on the site and conduct detailed research on the blood distribution patterns on the site, they can analyze the occurrence process of the case and carry out the crime scene reconstruction. [3, 4, 5] In practice, there are many cases in which blood trace analysis is successfully applied to reconstruct a crime scene. [6, 7, 8, 9]

1.2 Blood clotting information missing from the scene investigation of a murder case.

On the morning of March 6th of a certain year in a remote village in a county, a newly married couple of ethnic minorities were found dead at home. The scene was bloody. The young couple were cut in the neck by sharps, including the neck of the male owner. The cut almost cut the cervical vertebrae. The case caused an uproar in the local area. Government leaders at all levels visited the site to listen to the report. The provincial and municipal level three investigations and technical forces focused on the case.

On-site investigation: The site was a single-family structure with a well-locked door. The hostess was lying on the floor with her clothes on her back. The male owner was lying naked on his back and lying on the floor with a lot of splashes and dripping blood on the floor. And the TV cabinet drawer did not obviously flip, the blood stains were only indoors, there was no blood stain outside, and there were no weapons left on the scene. After the on-site survey technicians performed the

video recording according to the survey requirements, the forensic doctor moved the two bodies to the scene and immediately carried out the post-mortem examination. Forensic autopsy: In addition to sharp cutting wounds in the neck, there are many resistance injuries on the hands and body. In addition to sharp cutting wounds deep into the cervical spine, there are parallel shallow sharp cutting wounds in the neck of the male host, and there are many shallow sharp stabbing wounds near the abdominal navel. When the forensic doctor analyzed the case, only the hostess who had combined with the two normal physiques had resistance to the injury, and the suspected hostess was killed by the male owner. The shallow cut injury and abdominal puncture of the male owner's neck were suicide. Healing the injury, but the male owner's neck sharpness injury is very serious. The average person can't commit suicide by cutting off his cervical vertebrae. What is more critical is that if it is a suicide, the tools for suicide were not found at the scene. The person who called the police insisted that they would call the police after finding the two dead people. They did not touch the items at the scene, took nothing from the scene, or saw any knives at the scene. The case was advanced by homicide, a large number of scouts worked in the village to arrange the work, the scene investigation continued, and the physical evidence was sent for inspection. All the work was tense until 23 p.m. The family members finally could not resist the pressure to tell them when they found the scene: when they saw the dead couple died, the dead man held a dagger in his hand, and understood that it was the master who killed the woman. The owner then commits suicide, afraid of not being able to face the woman's family members, first hide the dagger, and then call the police. (See Figure 1).



Figure 1 hidden dagger

During the subsequent photo of the scene, it was found that the male owner was lying naked on his back. His hands naturally leaned on the side of the body. The right hand was half-cuffed, and there were two shallow blood marks on the opposite abdomen of the right hand. Around the blood marks, there are thick blood marks around the relatively light blood marks, and the shape of the blood marks in the shape of the dagger. These two bloodstains are formed by the male host's suicide sticking blood and docking on the abdomen skin. (See Figure 2)



Figure 2 photo of the male owner's body

If the bloodstain is found at the scene investigation stage, it can be revealed that there is a dagger in the hands of the male deceased in the original scene, and the dagger stops at the abdominal position twice before the bloodstain coagulates. The bloodstain on the upper part of the dagger stops at the abdomen until the bloodstain completely coagulates. The message of blood clotting is easy to get: the bloody dagger is held in the right hand, docked twice in the abdomen, and is still attached to the abdomen after the blood has completely congealed, and then the dagger is removed, forming a dagger-shaped blood blank. The interpretation of blood clotting information will be of great help to the analysis of the nature of the case. If the nature of the case can be characterized earlier, it will not cost a lot of manpower and resources to carry out a large number of early investigations.

2. Blood clotting application in blood analysis

The process by which blood changes from a flowing liquid state to a non-flowable gel state, that is, blood coagulation, is a process in which soluble fibrinogen in plasma is converted into insoluble fibrin. [10]

The blood vessels of the human body are damaged, and the blood flows out from the blood vessels. There is a process in which the liquid gradually condenses into a solid. This condensation process has its own characteristics. The blood flows or falls on the surface of the object, from the state of motion to the state of quiescence, forming bloodstains or Blood pooling begins to condense from the most marginal or thinnest part of the blood and blood pool until it is completely condensed.

In the blood coagulation process, since the blood is in a liquid state before the blood is coagulated, the blood will have a liquid characteristic. When the blood flows through the edge of other objects, it cannot infiltrate below the compressed object, and a blood blank area is formed after the blood coagulates. As exemplified in Fig. 1, the blood-stained dagger is in close contact with the skin of the abdomen, and the blood forms a blank area of blood at the skin pressed by the scalpel.

It takes a certain time for blood to condense from the liquid to the solid. If it is not completely condensed, if the object that adheres to the blood stain moves, there will be traces of liquid dragging. If there is a trace of dragging, it means that the object moves when the blood is not condensed. Conversely, if a blood-stained item moves, but there is no trace of blood-staining, it means that the movement of the object occurs after the blood has condensed. For example, in a murder scene, an 80-year-old woman was killed in her home and the door lock was intact. On-site investigation revealed that a blood-stained rope was moved next to the body. The movement of the rope did not produce blood-staining. This blood-stained rope only moved after the blood was condensed, so that there was no trace of drag. Combined with the weather and scene conditions, it took at least half an hour to condense the blood on the bloodstained rope, and it was concluded that the killer returned to the scene for at least half an hour after the murder. For the murder scene, it can also enter the scene again to flip, indicating that the killer is very familiar with the scene situation, has confidence in the "safety" of his return to the scene, and analyzes that the killer is familiar with the surrounding environment of the scene and lives near the scene of the crime. The investigation revealed that the murderer was the neighbor of the deceased downstairs. The second time he entered the scene was to pick up the gold jewelry on the deceased and inadvertently moved the rope with blood on his side. [11]

After the blood forms blood droplets, blood flow, and blood pool, it begins to condense from the edge of the bloodstream toward the center. In the on-site survey, we will encounter a kind of hollow round blood. The blood pattern is formed by blood dripping on the smooth non-permeable ground. The condensation starts from the edge of the blood drop. After the condensation has been carried out for a period of time, the blood is covered with cloth. The object is slightly swept, and the cloth texture object drags the blood part of the liquid in the middle of the blood drop, leaving a hollow circle of the already condensed blood. The width of the hollow circle depends on the length of the condensation. The longer the time, the wider the width of the hollow circle. If the blood droplets are all condensed for a long time, the blood texture of the solid circle will be left under the slight sweep of the cloth texture object.

In general, blood condenses from a liquid to a solid. This process is irreversible. When the blood condenses to a solid, it loses the properties of a liquid, easily immersed object. For example, in a murder case, a couple and mother-in-law went to work in the city and rented in a bungalow. When the husband went out for two days to return home, he found that his mother died in the rental room and his wife disappeared. After on-site investigation, the mother-in-law lay on the ground, covered with blood, the body covered with a white sheet, no blood was found on the sheet. There is no blood stain on the sheet, the white sheet is on the back of the blood clot on the body. Combining with the site conditions, a large amount of blood stains on the body need more than two hours to coagulate to the state of covered with white cloth and not stained. Finally, it is concluded that only daughter-in-law can kill a person and then put a white cloth on her mother-in-law's body a few hours later. [12]

3. Conclusions

Not only the size, shape and distribution of blood stains can be applied to the analysis of blood stain morphology at crime scene, but also the coagulation process from liquid to solid will occur when blood flow out of the body from vascular breakage. The coagulation characteristics of blood stains can also be used in field analysis and reconstruction. The blood is liquid before coagulation. The liquid blood has its characteristics of fluidity and easy infiltration. It often forms marginal blood stains at the edge of the object and presents blank areas below the object. When the bloodstained object moves under the condition of incomplete coagulation, it will make the bloodstain appear dragging marks, which can be used to judge the moving time of some bloodstained objects. It takes a certain time for blood stains to completely coagulate, and the coagulation process is an irreversible process. After coagulation, blood stains lose the property that they are easy to impregnate other objects, so the time when blood stains touch objects can often be analyzed. The blood stains on the murder scene should make full use of the formation mechanism and characteristics of blood stains, fully mine the information of the crime scene, better analyze it and accurately complete the reconstruction of the crime scene.

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