

A Review of Internal Bleeding Causes, Symptoms and Surgery

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Abstract: This paper aimed to review symptoms, causes and surgery of internal bleeding. The symptoms of internal bleeding vary depending upon what part of the body is involved or what organ system is damaged. Symptoms may be dramatic, arise gradually, or the patient may have no initial complaints. Internal bleeding may cause significant pain and then gradually resolve spontaneously. Blood outside of blood vessels can be very irritating and the patient will complain of acute onset of pain. However, the treatment for most ruptured cysts is time and symptom control until the body absorbs the blood and the inflammation resolves. The amount of bleeding and the location are associated with the presentation and outcome. A small amount of blood (1 or 2 ounces) under the skull can cause significant loss of brain function due to an increased buildup of pressure, since it is like a solid box and doesn't have the ability to expand to accommodate extra volume. When the internal bleeding begins to form a clot, it is called a hematoma.

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1. Introduction

Blood is meant to be circulated by the heart through blood vessels to supply the body's organs with oxygen and nutrients. These blood vessels include arteries, veins, and capillaries. When the integrity of the blood vessel wall is damaged, there is a clotting mechanism in place to repair the damage and minimize the amount of blood that leaves the injured blood vessel. External bleeding is usually easy to recognize. A laceration of the skin bleeds, a person may cough or vomit blood, or a woman develops vaginal bleeding.

The symptoms of internal bleeding vary depending upon what part of the body is involved or what organ system is damaged. Symptoms may be dramatic, arise gradually, or the patient may have no initial complaints. For example, a patient may complain of total loss of vision in an eye if bleeding occurred within the globe; or a patient with a ruptured abdominal aortic aneurysm may be unconscious, in shock with no blood pressure, and a feeble pulse; occasionally small subdural hematomas are found in people getting a CT scan for other reasons and the patients will have no symptoms at all.

Some internal bleeding may cause significant pain and then gradually resolve spontaneously. For example, an ovarian cyst rupture is quite common and usually very painful and causes some blood to leak into the peritoneal cavity (the space that contains the abdominal organs). Blood outside of blood vessels can be very irritating and the patient will complain of acute onset of pain. However, the treatment for most ruptured cysts is time and symptom control until the body absorbs the blood and the inflammation resolves.

The amount of bleeding and the location are associated with the presentation and outcome. A small amount of blood (1 or 2 ounces) under the skull can cause significant loss of brain function due to an increased buildup of pressure, since it is like a solid box and doesn't have the ability to expand to accommodate extra volume. Should that same small amount of blood accumulate quickly in the pericardium (the sac that surrounds the heart) it might prevent the heart from adequately beating but should the internal bleeding take days or weeks to accumulate, the heart could adjust and continue to function. When the internal bleeding begins to form a clot, it is called a hematoma.

Internal Bleeding Causes

Internal bleeding may be caused by the following conditions:

1. Damage to a blood vessel that can't easily be repaired by the body's internal mechanisms;
2. Not enough clotting factors in the blood to make the repair; or
3. Medications that are taken to prevent abnormal clotting.

Most people appreciate that injuries occur when great force is applied to the body. Falling from a height or being involved in a car accident may cause compression or deceleration forces that can damage the organs in the body without necessarily lacerating or cutting the skin. External bleeding is easy to recognize. Internal bleeding may be more difficult to appreciate.

Damaged Blood Vessels

Damage to the blood vessels occurs due to trauma. The amount of internal bleeding that occurs depends upon the severity of the force applied, the blood vessel that is injured, and the condition of the patient prior to injury. For example, a person taking warfarin (Coumadin), a medication that inhibits blood from clotting, will likely have more bleeding from the same amount of force due to trauma than a person whose clotting factors are working normally.

Blood vessel walls may be weakened because of chronic high blood pressure, which can cause them to dilate and form aneurysms that are at higher risk of bleeding because of weak vessel walls. However some aneurysms may also be congenital (present from birth). Regardless, the aneurysms are at risk for leaking or rupturing, and depending upon their location, may have devastating consequences. For example, an aneurysm of a cerebral artery (those that supply blood to the brain) may bleed and cause a hemorrhagic stroke; while a patient may bleed to death due to an aortic aneurysm that ruptures, causing severe internal bleeding into the abdominal cavity.

Orthopedic injuries almost always cause internal bleeding. Bone marrow is where blood cell production takes place and it has a generous blood supply. When a bone breaks, significant bleeding may be expected. Long bones like the humerus (upper arm bone), femur (thigh bone), and pelvic bones can cause the body to lose 10% or more of its blood supply.

Compression injuries occur when an external force is applied to the body and an organ is compressed between two hard surfaces. For example, if a football player is tackled, the force of the tackle may compress the spleen between the ribs and the backbone enough to make it rupture and bleed. Or imagine a weight falling on a foot compressing the tissues and the bones of the foot between the weight and the ground; there is potential for bleeding because blood vessels have ruptured.

Deceleration injuries occur when the moving body is stopped very quickly. When traveling in a vehicle; an individual is moving with the speed of the car. If the car hits a wall, the speed becomes zero very quickly. A classic deceleration injury can occur when a rapidly moving human body strikes a stationary object (chest hits a steering wheel when the vehicle hits a tree), causing the moving aorta to hit the chest wall and rupture causing fatal internal bleeding. Different parts of the body will stop at different times and the difference in the deceleration may cause organs to shift and the blood vessels that are attached to tear. If a person hits their head in a fall, the brain may fall for a fraction of a second longer than the skull that initially hits the ground. This can cause the arteries that run on the surface of the brain to tear and bleed forming epidural or subdural hematomas.

Some individuals have inherited bleeding disorders that cause spontaneous bleeding. Minimal trauma or even no apparent injury can cause internal bleeding. The most common bleeding disorders are Von Willebrand's disease and hemophilia.

Clotting Factors

Clotting factors are manufactured in the liver and any damage to the liver will increase bleeding risk. While viral infections may cause hepatitis leading to liver failure, alcohol abuse is the most common reason for the liver to fail. Aside from the lack of clotting factors in the blood, liver failure or cirrhosis can also cause blood to flow abnormally in the liver or portal system, which leads to the formation of swollen veins in the esophagus and other parts of the body. Called varices, these veins have the tendency to spontaneously weaken and bleed.

Medications

Medications are often prescribed to "thin" the blood to prevent blood clots from forming or for treating blood clots that have already occurred. Common reasons for prescribing medications such as warfarin (Coumadin) and heparin (medications that inhibit clotting factor function) include atrial fibrillation, deep venous thrombosis, and pulmonary embolism. Clopidogrel (Plavix), dipyridamole (Persantine), and prasugrel (Effient) are medications that inhibit platelet function and are often used to prevent heart attack, stroke, and peripheral vascular disease.

Aspirin is an over-the-counter (OTC) medication that is commonly recommended to prevent heart attack and stroke. It works by inhibiting platelets that help blood to clot and can be a risk factor for internal bleeding.

Alcohol, smoking, aspirin, ibuprofen and other nonsteroidal antiinflammatory medications can cause irritation of the lining of the esophagus, stomach, and intestine thus predisposing individuals to internal bleeding.

Other Causes of Internal Bleeding

Bleeding in pregnancy is never normal, though not uncommon in the first trimester and is a sign of a threatened miscarriage. Early on in pregnancy, the concern is that of ectopic pregnancy (tubal pregnancy), where the fetus implants in the Fallopian tube. As the placenta grows, it erodes through the tube and may cause fatal bleeding. Bleeding after 20 weeks of pregnancy may be due to placenta previa or placental abruption and emergent medical care should be accessed. Placenta previa describes the situation where the placenta attaches to the uterus close to the cervical opening and may cause painless vaginal

bleeding. Abruptio occurs when the placenta partially separates from the uterus wall and causes significant pain with or without bleeding from the vagina.

Depending upon the amount of blood loss, bleeding may occur as an expected result or as a complication of surgery. After cutting into tissue, the surgeon attempts to make certain all bleeding has stopped before the skin is closed and the operation completed. Sometimes, internal sutures can move or tissue can stretch and bleeding may restart. Often, nothing more than observation is needed, however in some situations, the surgeon may need to explore the surgical site for the cause of bleeding and repair it.

Often, the cause of internal bleeding may be a combination of many factors. The potential for internal bleeding depends upon an individual's underlying medical condition(s), medications being taking, and the injury or illness present.

Internal Bleeding Symptoms

The symptoms of internal bleeding depend upon the circumstances. Sometimes it is the location of the bleeding and not the amount that makes the difference. Sometimes it is the amount of blood that is lost and sometimes it is a combination of the two.

- Shock may occur if there is enough blood lost to decrease the amount of blood within the circulatory system. The signs and symptoms of shock may include rapid heartbeat, low blood pressure, cool and sweaty skin, and abnormal mental function or confusion.

- Most healthy people can lose 10% to 15% of their blood supply and show minimal signs of shock. This blood loss is the equivalent of donating a pint of blood. Symptoms become more severe as more blood is lost.

- Children, the elderly, and those taking certain medications may not exhibit classic signs and symptoms and medical care providers may need to maintain a higher level of suspicion when looking for internal bleeding.

- Orthostatic hypotension (becoming dizzy when attempting to stand) can occur in patients with internal bleeding.

- Bleeding usually causes pain and the area of the body affected is usually the site of the person's complaint. Blood that leaks outside of a blood vessel is very irritating and causes an inflammatory response.

- Blood in the peritoneum causes intense pain that is sometimes difficult to localize especially if blood is spilling everywhere.

- Blood that irritates the diaphragm (the muscle that separates the chest from the abdomen) may cause pain in the chest or pain that radiates to the shoulder.

- Blood may eventually track towards the surface of the skin and can be seen as bruising. Bruising of the flank (Grey-Turner's sign) or around the umbilicus (Cullen's sign) indicate intra-abdominal bleeding.

The complaint of pain is just one element of the history that is taken by the health care practitioner in trying to determine the source of internal bleeding.

Some organs do not tolerate even minimal amounts of bleeding and will exhibit symptoms of decreased function. Examples of include:

- Bleeding in the brain is usually associated with decreased mental function which may include vomiting, lethargy, seizure, or coma and unconsciousness. There may be the signs of stroke including slurred speech, loss of vision, and weakness of one side of the body.

- Signs and symptoms of bleeding in the eye are decreased or hazy vision, floating objects in the vision, or blindness.

- Some bony joints have little room and bleeding can cause immediate and significant pain. Individuals with hemophilia may complain of chronic pain that is hard to manage or not relieved by ordinary medical intervention (intractable pain) because of bleeding into a joint. This is also true for individuals taking warfarin or heparin.

Signs of internal bleeding may take time to appear, for example:

- Bleeding from the kidney or bladder may not be recognized until the patient needs to urinate and then the blood is apparent.

- Black tarry stools may indicate bleeding in the stomach or small intestine. (Please note that while a black bowel movement should be concerning, it may also be seen in patients taking iron supplements, Pepto Bismol, or other medications and dietary products).

- Bleeding from an orthopedic injury, usually of the forearm or shin, may cause gradual increase of the pressure within the muscle compartments causing blood supply to the affected area to be compromised. This can lead to intense pain, tingling, numbness, and decreased motion. Compartment syndrome is relatively unusual and does not necessarily occur only with a fracture, since significant contusions can also cause increased pressure.

- Blood from a body orifice (mouth, nose, ears, anus, vagina, or urethra) may be a symptom of internal bleeding.

Unfortunately, most of the symptoms of internal bleeding can occur with other medical problems and frequently it takes a doctor to order medical tests to determine the cause of the symptoms listed above.

Intracranial hematomas describe blood clots that occur within the skull. These clots affect brain function because any bleeding or swelling may cause

increased pressure to build within the closed space of the bony skull. The increased pressure squeezes the brain and causes it to stop functioning appropriately. Symptoms may include nausea, vomiting, headache, and mental alterations. Intracranial hematomas are named based upon where they are located, either within the brain, the tissues that line the brain, or in the spaces that bathe the brain in fluid (CSF=cerebrospinal fluid).

When to Seek Medical Care for Internal Bleeding

Internal bleeding may occur in a variety of ways depending upon where the bleeding occurs and under what circumstances. Situations in which one should seek medical care include individuals who:

- appear cool, clammy, sweaty, and are confused;
- have signs of a stroke, including confusion, lethargy, loss of vision, and change in speech, facial droop, or weakness of one side of the body;
- are vomiting blood or bleeding from the rectum (rectal bleeding is not normal and could signal the potential of significant blood loss); or
- have blood in the urine.

Internal Bleeding Exams and Tests

The diagnosis for internal bleeding begins with the health care practitioner taking a history and performing a physical examination on the patient. The situation and the source of the bleeding will focus the testing strategy on the part of the body that may be involved with the bleeding. Sometimes the direction of diagnosis is self-evident; a motor vehicle crash victim who complains of abdominal pain will have attention directed to the abdomen. Sometimes it is less evident. A confused patient may have issues with bleeding in the brain, or may be so anemic (decreased red blood cell count) from blood loss elsewhere, that the brain is not getting enough oxygen and nutrients to function properly.

Blood tests may include:

- A complete blood count (CBC) or hemogram to access for anemia and an abnormal platelet count.
- INR (international normalized ratio) and PTT (partial thromboplastin time) are blood clotting studies that may be measured to screen for abnormal coagulation.
- Depending upon the situation, the hospital blood banking system may be alerted to begin the process of crossmatching blood products for potential transfusion.

Diagnostic imaging tests such as X-rays, Doppler ultrasound, and CT scan may be used depending upon the suspected underlying medical problem associated with the internal bleeding.

Computerized tomography (CT scan) is the primary tool used in emergency situations to access for bleeding or swelling in the brain. In a small fraction of patients who have bleeding from a ruptured cerebral aneurysm (a blood vessel that leaks in the brain), the CT will initially be normal and a lumbar puncture may be performed to help make the diagnosis.

CT scan is also one of the tests that can be performed to access for bleeding within the abdomen and chest. It is especially helpful in trauma to look for bleeding from the solid organs of the abdomen like the liver, spleen, and kidney. It is ideal for evaluating the retroperitoneal space for bleeding and can also evaluate fractures of the pelvis and spine.

In cases of potential bleeding from a major blood vessel, CT angiography may be considered to look for a specific blood vessel that is bleeding.

Ultrasound may be used to look for sources of bleeding, most often where there is an obstetric or gynecologic source of bleeding.

Endoscopy, colonoscopy, and endoscopy are used to look for sources of bleeding in the gastrointestinal tract. Using a flexible scope with an attached camera, a gastroenterologist may look into the stomach and intestine, rectum, and colon to find the source of bleeding. Using the same instrument, cautery (electricity used to coagulate or cauterize a blood vessel) may stop the bleeding if the source is found.

Internal Bleeding Self-Care at Home

In most cases of internal bleeding, there is no role for self-care at home until the patient has been seen and released from a medical facility. Then self-care consists of rest and avoiding situations that cause rebleeding (for example, rest after surgery, avoiding alcohol).

If significant internal bleeding has occurred and the person appears to be in shock, emergency medical services should be activated (call 911 if available). The person should be laid flat with their feet elevated if possible. However, if the bleeding is due to trauma, and there is a possible risk for neck or spine injury, the individual should not be moved (in most cases) until they have been evaluated by emergency personnel.

If the patient has signs of a stroke, emergency medical services should be activated since it is difficult to determine if the decreased brain function is due to bleeding in the brain or because of decreased blood supply due to a blocked blood vessel. Treatment for this second situation requires that the individual get to the hospital as soon as possible because the time window to start treatment is very short.

Other potential internal bleeding illnesses need medical care in a timely fashion and it is reasonable to contact your health care practitioner for direction.

Medical Treatment for Internal Bleeding

Initial treatment of internal bleeding will include stabilizing the patient, meaning that the ABCs of resuscitation take priority for the care provider.

- A: Airway. Patients with altered or decreased mental status may not be awake enough to breathe on their own.
- B: Breathing. Even if the airway is open, the lungs may not adequately be functioning and the patient may need help with their breathing so oxygen can be transferred from the lungs to the bloodstream.
- C: Circulation. The body requires blood to circulate to all its cells to provide oxygen and nutrients and to remove waste products. Treatment is aimed to maintain blood pressure and circulation. Often intravenous fluids only are required. Sometimes blood transfusion is needed. A few patients will require immediate transfusions with universal donor blood (type "O negative" blood).

Specific treatment for internal bleeding depends upon the source of the bleeding. The common goal for treatment is to find the source of bleeding and stop it. At the same time, treatment will be directed to repair or stabilize any damage that the bleeding caused.

Once the acute situation has resolved, treatment will be aimed at correcting the underlying cause of the bleeding and to prevention of future episodes.

Internal Bleeding Surgery

Surgery is reserved for those patients with internal bleeding where the bleeding cannot be controlled by less aggressive treatment or where the bleeding is causing damage because of its location. Some examples include the following:

- Neurosurgeons may operate to remove blood clots that are pressing on the brain (epidural or subdural hematomas) but depending upon the situation, the decision to observe the patient and watch them recover without surgery may be appropriate.
- When bleeding occurs in the abdomen, general surgeons may need to operate to find and repair the bleeding source. In some cases, interventional radiologists may work with a surgeon and using angiography, find the source of bleeding and repair it without performing surgery.
- Vascular surgeons are often called upon to repair major blood vessels that have leaked or ruptured. Patients with aortic aneurysms that have ruptured may need emergent lifesaving surgery, while those whose aneurysm have expanded but not

ruptured may be candidates to have stents placed using angiography.

- When orthopedic surgeons repair fractures, it has an added benefit of decreasing the amount of bleeding from the fracture site and minimizing future blood loss.

Internal Bleeding Follow-up

Internal bleeding is not normal. Aside from making certain that the bleeding has remained under control and any tissue damage begins to heal, follow-up care often addresses the reasons the bleeding occurred in the first place. Patients that are prescribed ant clotting medication need to have scheduled tests and follow up with their physicians to determine if they are under or over ant coagulated.

Conclusion:

Bleeding is the loss of blood. Bleeding may be:

Inside the body (internally)

Outside the body (externally)

Bleeding may occur:

Inside the body when blood leaks from blood vessels or organs

Outside the body when blood flows through a natural opening (such as the vagina, mouth, or rectum)

Outside the body when blood moves through a break in the skin Internal bleeding covers many organ systems and situations. Disease and injury prevention is the basis of maintaining a healthy lifestyle.

Cornerstones of prevention include preventing heart attack and stroke by controlling high blood pressure, diabetes and high cholesterol.

Injury prevention includes wearing appropriate safety equipment for the activity involved and avoiding risky behaviors like drinking and driving.

Preventing alcohol-related diseases can help prevent a significant cause of internal bleeding.

Individuals taking medication that predispose them to internal (and external) bleeding should take extra precautions to avoid any trauma; moreover, they should continue to get routine blood tests (INR, PT, CBC's) to see if they are appropriately medicated and assure that they are not bleeding internally.

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