

Stopping Bleeding is a Priority in Any Injury

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Received Date: October 26, 2022; **Accepted Date:** November 17, 2022; **Published Date:** December 16, 2022.

Citation: Siniša Franjić, (2022) Stopping Bleeding is a Priority in Any Injury. *International Journal of clinical and Medical Case Reports*, 1(2); DOI: 10.31579/2834-8664/009

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Abstract

Bleeding is caused by an injury to a blood vessel. External bleeding is visible because the blood flows out on the surface of the body. Internal bleeding occurs inside the body so it can remain unrecognized for a long time. The intensity of the bleeding depends on the size of the injured blood vessel. In case of injury to a larger vessel, the blood will flow out in a stream, so the patient can bleed out very quickly. That is why stopping bleeding is a priority first aid procedure for any injury.

Keywords: bleeding; hemorrhage; trauma; shock; patient

Introduction

Uncontrolled hemorrhage leads as a reason of death in each civilian and military trauma settings, accounting for almost 35% of trauma deaths, second simplest to vital apprehensive system damage [1]. Most of those deaths arise earlier than accomplishing definitive care, making the prehospital surroundings in particular critical for hemorrhage manipulate. The technological know-how of hemorrhage manipulate has superior in current years, making new tools to be had to each civilian and military out-of-hospital personnel. Advances throughout navy war regularly bring about development in civilian care as researchers and physicians recognition on prehospital control of intense hemorrhage. Within the beyond decades, substantial advances have included numerous hemostatic dressings and ready- to-use tourniquets, in addition to improved education of their use.

Patients

All significantly injured sufferers have to have their pulse charge, blood strain, breathing charge, stage of consciousness and tissue oxygenation monitored constantly [2]. Patients with an related head damage have to be monitored the use of the Glasgow Coma Scale. A urinary catheter and the size of vital venous strain offer extra valuable records for tracking resuscitation whilst there are signs of hypovolaemia. An intra-arterial strain line is likewise very beneficial for constantly tracking the blood strain, and lets in clean sampling of arterial blood for blood fueloline and acid/base size.

Once blood loss is suspected, the affected person have to take delivery of instantaneously fluid alternative via wide-bore cannulae inserted into the veins of the cubital fossae. Fluid may be given quicker via a vital venous catheter if this has been inserted for tracking functions and isn't contra-indicated with the aid of using the presence of neck and chest accidents. One to 2 litres of crystalloid (everyday saline) or colloid have to be given after sending a pattern of the affected person's blood for grouping and

cross-matching. For sufferers with clean symptoms and symptoms of surprise, request as a minimum 4 devices of blood.

Patients who fail to reply to the fast recovery in their blood quantity withinside the absence of cardiac or major breathing problems, e.g. tamponade or anxiety pneumothorax, possibly have intense persevering with blood loss. In those situations the blood transfusion have to be began out whilst creating a fast evaluation of the ability sites of hid blood loss. The maximum not unusualplace are the pleural or stomach cavities. Fractures of the pelvis also can reason catastrophic blood loss.

The retroperitoneum can contain litres of blood with few outside physical signs.

A fast medical examination searching out chest dullness, stomach distension and stomach tenderness (if the affected person is conscious) have to be observed with the aid of using chest radiography, insertion of chest drains and automated tomography (CT) scanning of the torso or peritoneal lavage wherein indicated. Properly warmed Group O Rh-negative blood or, as a remaining resort, uncross-matched blood may be given if the scenario is dire. The affected person have to be transferred to an working suite as soon as the site of blood loss has been established.

Echocardiographs and electrocardiographs (ECGs) may be useful if cardiac damage or coincidental cardiac disorder is suspected. The ECG leads have to be saved related to a screen for the detection of any dysrhythmias. A cardiac contusional damage have to be suspected if there may be great ST phase elevation or depression. Very occasionally, an emergency thoracotomy withinside the twist of fate and emergency branch can be required to alleviate a tamponade, to suture a penetrating wound of the heart or to clamp the hilum of the lung or the descending aorta to save you large blood loss.

The adequacy of heart charge, blood strain, and typical perfusion turns into the point of interest of the evaluation [3]. Common threats to flow consist of cardiac arrest, myocardial disorder, and hemorrhage main to a

surprise state. Interventions are centered at restoring powerful flow via cardiopulmonary resuscitation, hemorrhage manipulate, IV vascular get right of entry to with fluid and blood management as necessary, and drug therapy. External hemorrhage is commonly pretty apparent and great managed with firm, direct strain at the bleeding site with thick, dry dressing material. This technique is powerful in reducing blood flow for maximum wounds. Tourniquets that occlude arterial blood flow distal to the damage can be taken into consideration to control intense bleeding from extremity trauma whilst direct strain fails to reap hemorrhage manipulate; hemostatic dressings (e.g., dressings impregnated with materials that velocity the formation of a blood clot) are every other crucial device to control life-threatening hemorrhage. Internal hemorrhage is a extra hidden worry that have to be suspected in injured sufferers or folks that found in a surprise state.

Assessment

Traumatic hemorrhage is the acute lack of circulating blood quantity due to damage [1]. Hemorrhage severity is in large part predicated at the quantity of blood misplaced earlier than hemostatic manipulate may be achieved. The quantity of blood loss will range as a feature of vessel defect, vessel length, kind, and anatomical region. Large defects now no longer simplest bring about extra bleeding however additionally in extra intake of clotting elements and platelets, growing the chance of coagulopathy. Brisk, pulsatile bleeding and the shiny purple hue of oxygenated blood become aware of arterial hemorrhage. Arterial bleeding manipulate would require the software of strain enough to triumph over the systolic blood strain and compress the muscular wall of the vessel. Venous bleeding is nonpulsatile, can be brisk if the vessel is big, and might seem darker till uncovered to oxygen. Venous bleeding will occlude at a whole lot decrease pressures, would require much less time to govern, and is extra amenable to using hemostatic sellers than arterial bleeding. Capillary bleeding is commonly a whole lot much less brisk than arterial or venous bleeding because of the smaller length of the concerned vessels, however can be tough to govern if the affected person has platelet or clotting thing disorder or deficiency.

The first step in hemorrhage manipulate have to be identification of the region of the damage and the sort of bleeding [4]. Differentiating an arterial bleed from venous bleeding is a critical step on top of things of hemorrhage. Bleeding from an artery is generally shiny purple in shadeation and have to spurt or pump blood from the wound. This sort of bleeding may be without delay life-threatening, with complete exsanguination viable in as low as three min. A venous bleed may be differentiated as commonly darkish purple in shadeation, with a regular flow from the wound. Venous bleeding will also be lifethreatening if a big vein is damaged. Capillary bleeding is the third kind and may be visible as darkish purple in shadeation with an ooze from the damage site. Serious bleeding from an extremity is the maximum common reason of preventable demise from damage. As such, life-threatening bleeding continually warrants instantaneously intervention.

After identification of outside bleeding, the primary responder have to fast manipulate the hemorrhage. The maximum fundamental and once in a while maximum a hit manipulate of bleeding is guide strain. The wound have to be uncovered, and a easy fabric or piece of garb may be used to assist cowl the bleeding place as targeted guide strain is implemented. A not unusualplace mistake is to accept as true with that large bleeding calls for a bigger place of strain for manipulate. If the blood is visible to be coming from a unmarried specific seen blood vessel, a fingertip judiciously implemented to the appropriate spot can prevent the bleeding. One not unusualplace situation visible that responds properly to unmarried finger hemorrhage manipulate is bleeding from a dialysis fistula supply. This bleeding may be staggering due to the fact that is an arterial-equal bleed. But a fingertip located very lightly precisely at the bleeding site effortlessly stops the bleeding and lets in for vascular surgery session and repair. This is a whole lot extra cushy for the affected person than a tourniquet for this specific supply of bleeding.

Airway Trauma

Acute airway trauma is an extraordinary yet probably deadly damage. It is historically categorized as blunt or penetrating in step with the mechanism [5]. Blunt trauma stays the extra everyday mechanism, despite the fact that the occurrence of penetrating trauma has been gradually growing over the last 30 years. The majority of blunt trauma is due to motor vehicle collisions, intently observed with the aid of using sport-associated and domestic violence-associated trauma. The supply of maximum penetrating accidents is secondary to gunshot or stab wounds.

The number one dreams of airway intervention are to alleviate or save you airway obstruction, stable the unprotected airway from aspiration, offer good enough fueloline exchange, and preserve cervical spine stabilization. Gaining manipulate of the traumatized airway is the last check to the of the company's adeptness and medical acumen because the company have to count on that the affected person has a complete belly and an unstable cervical spine, situations that exacerbate an already tough task. It calls for know-how of the dangers encountered secondary to the damage itself as properly as the ones attributable to interventions with the aid of using the anesthesiologist.

When a trauma affected person arrives to the emergency room or resuscitation bay, the preliminary moments have to be devoted to acquiring the maximum fundamental records approximately the general condition: stable, unstable, moribund, or deceased. The number one survey of the Advanced Trauma Life Support protocol includes fast assessment and stabilization of the functions which might be critical to survival: airway patency, breathing, flow with hemorrhage manipulate, assessment of incapacity with short neurologic exam, and publicity of the affected person with the aid of using elimination of all articles of garb.

During those preliminary moments of the encounter, the anesthesiologist have to be responsive to any signs of airway trauma, because the maximum essential step in control of acute airway trauma is reputation of the condition. The doctor have to have a excessive index of suspicion withinside the putting of anterior cervical trauma. Symptoms together with hoarseness, dyspnea, dysphagia, dysphonia, and ache with phonation are regularly visible with laryngeal trauma, while crepitus, stridor, hemoptysis, anterior cervical edema, ecchymoses, and laceration are commonly representative of laryngeal-tracheal damage. For sufferers with laryngeal-tracheal damage, airway manipulate is essential and have to be as fast as viable.

Shock

Hemorrhagic surprise is a failure of the cardiovascular system to supply good enough oxygen to tissues to support cardio metabolism because of blood loss [1]. Hemorrhagic surprise reputation has classically relied on abnormalities of critical signs, look of the skin, urine output, and mental status. Although supplying the idea of surprise reputation and evaluation, those metrics are constrained with the aid of using some of critical elements. Physiologic reaction in sufferers on antihypertensives and different pharmacologic sellers are regularly blunted. Healthy sufferers and children can also additionally have enough physiological reserves to put off changes in heart charge, blood strain, and breathing charge, in spite of substantial blood loss. Urine output can not often be assessed withinside the prehospital surroundings, and mental status, whilst touchy to hypotension because of blood loss, may be clouded with the aid of using concomitant head trauma, intoxication, psychoactive agent use, hypoglycemia, or mental illness.

Alternative predictors of the severity of surprise consist of pulse strain or surprise index, each of which may be calculated from conventional critical signs. Pulse strain is the difference among systolic and diastolic blood pressures. Use of pulse strain in trauma is primarily based totally at the precept that hemorrhage will boom the systemic vascular resistance, growing diastolic strain. At the equal time, reduced preload will sooner or later produce a discount in systolic strain. Narrowing of pulse strain takes place earlier than substantial decreases in systolic blood strain. Dynamic

adjustments in pulse strain had been used as a marker for cardiac output and quantity status. Shock index is calculated with the aid of using dividing the coronary heart charge with the aid of using the systolic blood strain and has been proven to be extra touchy than both of the critical signs alone. Shock index predicts surprise states in seriously injured trauma sufferers and is predictive of headaches following hospital admission. Shock index may be adjusted to atone for age-associated variations in body structure for children and the elderly.

Point of care lactate size has validated application withinside the prehospital putting for figuring out hemorrhagic surprise and the want for in addition resuscitation in trauma sufferers. A novel technique for measuring and diagnosing surprise is tissue oxygen saturation (which may be measured peripherally). Near-infrared spectroscopy permits size of tissue oxygen saturation and offers records on neighborhood microvascular activity. Early laboratory research display it to be an advance marker for hemorrhagic surprise than general critical signs. Heart charge variability measurements can be expecting mortality however do now no longer carry out better than different not unusualplace indices, and they will now no longer be the great for assessment of hemorrhagic shock. Sublingual capnography theoretically acknowledges neighborhood tissue hypoxia and microcirculatory damage, however current research endorse it isn't gift in advance than general critical signal adjustments. Decision regulations together with the Revised Trauma Score and Mechanism, Glasgow Coma Scale, Age, and Arterial Pressure had been advanced and verified for predicting in-hospital mortality of trauma sufferers the use of prehospital assessments. The application of such decision regulations in figuring out actively bleeding trauma sufferers withinside the discipline calls for in addition investigation. One such rule, the Assessment of Blood Consumption rating, predicting the want for blood merchandise, has been verified at a couple of centers, despite the fact that this rule calls for acquisition of targeted stomach sonography in trauma exam. The application of the Assessment of Blood Consumption rating prehospital is pending in addition investigation.

Vasopressors

From the prehospital surroundings to the intensive care unit (ICU), hemorrhaging trauma sufferers development via exceptional stages of surprise, described with the aid of using the complicated physiologic reaction and the healing approach [6]. Prohibiting vasopressor use withinside the first 24 h in sufferers with surprise and hemorrhage can also additionally extensively restriction the healing arsenal to evolve and shift the reaction as needed. As uncovered withinside the previous sections, the to be had experimental and medical proof is inadequate to avert in precept using norepinephrine or vasopressin withinside the preliminary 24-h control.

Based on those data, it appears apparent that vasopressor use can simplest be taken into consideration after a fluid challenge, possibly among 500 and 1000 ml, fails to reap hemodynamic stabilization, as recommended. If fluid fails, it's far possibly that the affected person is decompensating into the distributive segment of surprise and fluid and blood by myself will now no longer be capable of save you in addition medical deterioration; vasopressors can be required to save you extended hypotension, related with an boom in organ harm. Many mature trauma structures control to boom survival of very significantly ill and seriously bleeding sufferers, however even the maximum green structures struggle to gain hemorrhage manipulate inside 1 h and delivery instances can also additionally exceed 60 min. Yet, it appears that evidently the longer the hypotensive segment lasts, the much more likely the affected person's dangers of organ harm. As a whole lot as it is apparent that permissive hypotension have to continue to be a vital detail of the harm manipulate approach to restriction blood loss, specially in penetrating trauma, there may be an an increasing number of robust motive to preserve good enough perfusion strain even earlier than hemorrhage manipulate is achieved.

It is proper that the definition of good enough perfusion stays a challenge. However, an boom in international trauma mortality has been defined for

arterial systolic blood strain decrease than one hundred ten mmHg after intense trauma. Recent tips from the Trauma Hemostasis and Oxygenation Research Network additionally spotlight this factor, elevating the systolic arterial blood strain goal from 80–90 to 100 mmHg. These strain stages can not be acquired with fluid growth and blood merchandise simplest in sufferers with profound and extended disturbing surprise. Large volumes of fluid resuscitation are in truth pretty harmful. The use of vasopressors turns into obligatory to attain those hemodynamic dreams. Higher targets appear critical, in particular in sufferers with accomplice disturbing mind or medullary damage and multisystem trauma, to govern cerebral and medullary perfusion strain.

For those reasons, the authors share the idea that norepinephrine and vasopressin have an area withinside the healing arsenal to deal with trauma sufferers in surprise, which includes people with active hemorrhage. Both agents have to be a part of a bridging approach to preserve tissue perfusion if hypotension is simply too lengthy or too profound. In no case but have to this approach grow to be an alternative choice to expedient hemorrhage manipulate. Furthermore, the strain stages centered with norepinephrine/vasopressin use require an inexpensive trade-off among tissue perfusion and overcorrection, which can also additionally boom bleeding with the aid of using growing the hydrostatic strain.

Pressure Points

Pressure factors have to be used for extremity wounds if direct strain and elevation do now no longer manipulate the bleeding and simplest in case you aren't accredited to apply a tourniquet (or if a tourniquet isn't available) [7]. Pressure factors may be tough to use to govern hemorrhage and aren't continually powerful. However, the use of strain factors to try and manipulate bleeding calls for no unique system and have to be taken into consideration in instances wherein different alternatives are unavailable.

For accidents too close to the frame to permit for tourniquet application (for example, accidents which might be too proximal or too near the trunk to use a tourniquet [junctional injuries]), direct strain and use of strain factors can be powerful. Tourniquets, but, may be improvised whilst commercially produced alternatives aren't to be had. Options for improvisation consist of belts and articles of garb tied across the limb as proximal as viable to the region of damage. If you have a desire among the use of a strain factor or a tourniquet to govern brisk bleeding in an extremity, use the tourniquet due to the fact it's far extra powerful and could reduce the threat that the affected person will die from extreme hemorrhage.

Pressure factors can also additionally theoretically be capable of manipulate bleeding with the aid of using stopping blood from flowing right into a limb. This is carried out with the aid of using compressing a prime artery against the bone at a particular region, a strain factor. Although there are numerous strain factors withinside the frame, the brachial artery strain factor (withinside the upper arm) and the femoral artery strain factor (withinside the groin).

DCS

Patients with high-energy blunt trauma, a couple of torso penetrating trauma, hemodynamic instability, coagulopathy, and/or hypothermia on admission are a whole lot much more likely to go through DCS (damage control surgery) [8]. Patients who're diagnosed to have complicated vascular accidents, multicavitary accidents, or multiregional accidents also are great served with the aid of using an abbreviated operation with an preliminary aim of controlling hemorrhage. Other signs for DCS consist of acidosis, hypothermia, operative time extra than 90 min, ongoing coagulopathy as diagnosed with the aid of using nonmechanical bleeding, and transfusion necessities of extra than ten devices of packed purple blood cells (RBCs). Early reputation of the want for DCS is crucial for optimum crew communicate and favorable affected person outcomes.

The operative dreams of DCS are manipulate of hemorrhage and gross contamination. The stomach is opened with a beneficant midline incision. Hemorrhage manipulate is received with quite a few strategies relying at the sort of damage, which includes packing, ligation, clamp application, and balloon catheter tamponade. Once bleeding is managed, interest is became to govern of contamination. The bowel is tested alongside its whole length; small defects are closed with simple suture closure, and large defects are fast resected with staplers. No reconstructive efforts are made. Bowel is left in discontinuity and vessels can also additionally be saved patent with brief shunts. The stomach is then rapidly "closed" with a vacuum-type stomach dressing. The stomach dressing serves a couple of functions: [1] offers brief stomach insurance to permit for second-look surgery, [2] optimizes possibilities of eventual fascial closure with the aid of using completely separating the stomach contents from the stomach wall and minimizing fascial retraction, [3] lets in for method of non-stop evacuation of fluid from the stomach, and [4] lets in for the anticipated growth of bowel secondary to edema from fluid resuscitation.

Conclusion

Any outflow of blood from damaged blood vessels is called bleeding, and it can be caused by injuries or some pathological processes. Heavy bleeding threatens the victim's life in a fairly short period of time, so it should be stopped immediately. There are about five liters of blood in a person's circulatory system, and it is considered that the loss of up to half a liter of blood does not endanger life, but any further exceeding of this limit increases the risk, which can end in shock and even death from bleeding. Bleeding can be external, where a person bleeds from an opening on the body – the mouth, nose, ear, genitals, rectum, ureters, or injuries to the skin. In internal bleeding, blood leaks from blood vessels inside the body.

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