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Wartime Abdominal Injuries

By CHARLES DYSON

SINCE the Battle of France in 1940, military surgeons of the United Nations have had relatively limited opportunities (with the exception of those in attendance upon the North African, Russian or Chinese forces) to deal with the abdominal injuries sustained upon the field of battle. Nothing in this war has yet been seen by the majority of our surgeons which could parallel the total casualties of the pitched week- or month-long battles of World War I. However, the present conflict has presented him with a new field of endeavour, for he must not only minister to the men who have been (and will be) injured on the field of battle, but he must also reckon with the injuries which total war visits upon the civilian population. As regards the latter group, the most fertile source of information is the English journals, whose writers have had extensive experience with casualties resulting from the indiscriminate bombings in the blitz of 1940.

A classification of wartime abdominal injuries divides them into four groups. This classification is intended only for convenience of discussion, and it should be remembered that considerable overlapping is possible:

1. Immersion blast injuries
2. Abdomino-thoracic injuries
3. Non-penetrating wounds of the abdomen
4. Wounds of the abdomen penetrating the cælom.

Immersion Blast Injuries:
Blast injuries of the abdomen are rare as a result of air-borne or land-based explosives. The lungs are much more susceptible to this type of injury, and a casualty who shows abdominal injury due to the compression wave or "blast" from near-by explosions nearly always has extensive and rapidly fatal blast injury in his lungs. However, in certain circumstances, notably when depth charges explode in the vicinity of men who have had to abandon ship and swim for safety, it is found that abdominal blast injuries are a real entity.

The clinical picture is that of emesis and haematemesis, diarrhoea
and melena, testicular pain (probably due to direct compression), and peculiarly enough, little or no external bruising.

The pathology is haemorrhage in the submucosa of the gut, subperitoneal tissues, and mesenteric effusion.

The treatment is conservative, especially if casualties are seen after twenty-four hours (which is commonly the case, for the men usually are injured as the depth charges on their sinking ship explode). If signs of a ruptured viscus develop, laparotomy is indicated.

**Abdomino-Thoracic Wounds:**

These combined wounds are not infrequent, and the assessment of the extent of damage will tax the ingenuity of the surgeon. The estimation of the path of the missile (if it be of the through-and-through type) may help him in such cases. The abdominal injury usually determines the prognosis, and since the wounding of a hollow viscus greatly augments the seriousness of the injury, it is apparent that wounds of the left diaphragmatic dome will exceed in fatality those of the right dome.

The abdominal organs most frequently injured in the combined wounds are liver, spleen, pancreas and kidneys among the solid viscera, and the stomach and splenic flexure of the colon among the hollow viscera.

The treatment of abdomino-thoracic wounds may be summarized as follows:

1. Expectant treatment is possible where
   (a) bullets or small bomb fragments have produced a through-and-through wound, if:
      (i) no gross damage has been done to the body wall;
      (ii) the track of the missile does not appear to compromise the celom or suggest exploration;
      (iii) the signs of abdominal haemorrhage or injury to hollow viscera are absent.
   (b) small fragments are retained in an inaccessible position in the liver (in right-sided wounds).

2. An open, blowing thoracic wound, or a "stove-in" chest takes priority in treatment.

3. If the track of a traversing missile, or X-ray evidence, suggests implication of the left sub-phrenic area, the thorax should be dealt with first, and access to the upper abdomen obtained through the diaphragm.
4. When the clinical evidence points to widespread intra-peritoneal injury which outweighs the thoracic fraction of the damage, laparotomy is indicated.

Non-Penetrating Wounds of the Abdomen:

Such wounds are usually caused by a crushing force as, for example, when buildings collapse during air bombardment. Consequently, this type of injury so far has been seen more frequently in the civilian population than among the armed forces.

The usual sites of injury are the spleen, liver, kidney and small bowel. Gordon-Taylor states that "actual rupture of the abdominal musculature along with visceral injury was infrequent in the last war; the blow that ruptured the belly muscles usually expending its force in that act. The increased destructive forces of modern warfare now destroy and damage without any fine anatomical distinction".

The question arises when the surgeon is faced with such an injury: "Should this case have a laparotomy?" Peritoneoscopy may be of value, but wartime surgical theatres usually do not have such facilities.

Schrire, in the British Medical Journal, suggests several diagnostic points indicating laparotomy in cases of non-penetrating injuries. For example:

(a) Shock: There is one definite time when primary shock has passed, and internal haemorrhage (if any) has stopped of its own accord temporarily. This is usually about two hours after resuscitation measures have started. Operation before this ideal time will only intensify shock, and after this time the blood pressure may rise sufficiently high to renew the haemorrhage. Schrire states that "one must be prepared to face the fact that a subject who is so injured that he bleeds to death internally without recovering from primary shock is not a subject for surgery at all". Of course, this infers that every attempt be made to prevent the patient from slipping over into secondary shock by the use of warmth, sedatives, etc., plus the use of intravenous blood or blood derivatives.

(2) Pain: This symptom is of little value, for the severity varies with the patient, and pain in the region of the abdomen may only be referred from the thorax by the lower intercostal nerves, or it may be due to direct spinal cord injury.

(c) Tenderness: Practically all casualties with abdominal injury exhibit some tenderness. Its chief value from a diagnostic point of view is when it appears at a site of the abdomen remote from the original injury. Such a finding denotes peritoneal irritation due to leakage of the contents of some perforated hollow viscus. It should be remembered that free blood may also be a powerful peritoneal irritant.
(d) RIGIDITY: As with tenderness, local rigidity at the site of injury has less meaning than an area of remote rigidity, again suggesting perforation and peritoneal irritation.

(e) PULSE RATE: All cases of suspected intra-abdominal injury should have hourly pulse-checks, if possible. In such cases, a rising pulse-rate not otherwise accounted for should suggest intra-abdominal mischief. As a sign of peritonitis, however, it is usually too late to be of real service.

(f) OBLITERATION OF LIVER DULLNESS: Much has been made in the past of the obliteration of liver dullness as a sign of perforation of a gas-containing viscus. This is a late sign and should not be awaited; it is of little value in the presence of abdominal distension.

(g) X-RAY: Flat plates of the upper abdomen may be valuable after the patient has recovered from primary shock and is able to be propped up in a sitting position. The film should be checked for evidence of fluid levels under the diaphragm suggesting pneumo-peritoneum. Negative findings in this respect, however, do not rule out the possibilities of a ruptured bladder, haemoperitoneum, or small tears in the alimentary canal.

Finally, if the diagnosis of intra-abdominal injury is still in doubt, re-examination after one hour may enable one to reach a decision. Progressive, extending tenderness or rigidity are especially significant.

Wound of the Abdomen Penetrating the Cœlom:

This is perhaps the commonest type of wound of the abdomen, and is found on both the “home front” and the battlefield.

The nature of the projectiles chiefly responsible for these wounds is worthy of mention. During air bombardments, glass fragments, travelling at tremendous velocities, are capable of the most extensive wounds, ranging from horrible facial disfigurements to multiple perforations of the gut or complete evisceration of large portions of the abdominal contents. The wound of entry may be extremely minute.

Fragments of bomb-casings are a common source of intra-abdominal injury — the fragment in operable cases is usually not larger than a walnut. Bullet wounds do fairly well, although the use of incendiary bullets, with resultant burning and necrosis, may cause the surgeon to resect bowel where he would ordinarily only suture the opening. “Revolver bullets have a recovery rate which is flattering to the surgeon”.

The presence of an abdominal wound may or may not be obvious. Minute wounds may be easily overlooked, and a large pair of scissors is very useful in pre-operative examination centres to cut away all clothing to facilitate careful examination. The importance of buttock
WARTIME ABDOMINAL INJURIES

Wounds as portals of entry to the peritoneal cavity should not be overlooked. Twenty per cent of a series of cases of intra-abdominal injuries studied by Gordon-Taylor (using material drawn from the evacuation of Dunkirk, R.A.F., Royal Navy and civilian casualties of the 1940 blitz) had entry wounds in the buttocks.

Suggestions of intra-peritoneal damage are varied. Bladder or rectal tenesmus suggest that these organs have taken part in the injury. The absence of abdominal excursion during respiration should lead one to think of intra-peritoneal extension of the wound. Bulging of the flanks due to blood or fluid from ruptured viscera sometimes may be apparent. The facies should not mislead the surgeon; especially in soldiers, the desire to rest and sleep (because of loss of sleep, or sustained physical or psychic tension) may supercede any concern about even dangerous wounds.

Laparotomy is essential in all penetrating wounds, and thorough examination of the viscera for multiple injury is a necessity.

The chief causes of death in such wounds are haemorrhage, shock and peritonitis. It is not the intention of the writer to delve into involved technical procedures, but a few generalities may be useful. Wide exposures, control of haemorrhage, suturing of the gut in preference to resection (in most cases) are three important points.

As a general rule, infection is less important in abdominal wounds than in wounds of the extremities, because in the former the risk of infection tends to be overshadowed by risk of damage to the viscera.

Finally, Ogilvie states that "we must regard every man who is wounded in the abdominal cavity as certain to die unless operated on, and likely to die unless operated on early—within six hours. This calls for abdominal surgical centres well forward".

In closing, tribute must be made to the wider applications of the transfusion of blood or blood derivates; this method of treatment has made many patients operable who would otherwise have died. Sufficient statistical data have not yet been accumulated to accurately evaluate the role of the sulfonamides, but there is little doubt that their ever-increasing use will be more than justified.

SOURCES
Shock Due to Haemorrhage

By Peter F. Henderson

Etiology

The cause of this type of shock is, of course, haemorrhage, which must be great enough to produce clinical evidence of shock. Haemorrhage can occur as a result of many causes, e.g., destructive diseases which erode arteries, such as gastric or duodenal ulcers, or pulmonary tuberculosis; trauma to large blood vessels by stab wounds or flying glass. In these war years especially, industrial accidents and war injuries themselves will be the initial or practical causes of many cases of haemorrhage. This haemorrhage may be external—where blood escapes on the surface, or internal—where blood escapes into the tissues or into a cavity. Also, haemorrhage is known as arterial, venous, or capillary, according to the nature of the vessel from which it takes place.

In order to have the state of shock ensue there must be a sufficient loss of blood. Harkins\(^1\) maintains that the primary factor in shock is oligemia, whether due to frank haemorrhage, or loss of plasma by exudation to a traumatized area. In shock due to haemorrhage both plasma and formed elements are lost, and the patient is left anemic, which differentiates this shock from that due to other causes where fluid is for the most part mislaid.

Mechanism

If about 1,000 cc. of blood be removed from a patient, replacement is slow, and compensatory replacement of plasma amounts to only about 200 cc. After a severe haemorrhage, compensation is as follows: There is contraction of the peripheral vessels in the less important organs restricting the circulatory blood to vital centres. Reduction of oxyhaemoglobin by the tissues is more complete and the exchange of oxygen and carbon dioxide in the lungs is enhanced by hyperpnoea. There is dilution of the blood with a protein-poor fluid, followed by the formation and passage of newly formed plasma into the blood stream. Finally, erythrocytes are regenerated and the oxygen carriage is restored to normal.

According to Harkins,\(^1\) in shock the blood pressure falls, tissue anoxæmia results and general loss of capillary tone with increased permeability may follow. In all forms of shock there is a pale, cold skin, a rapid pulse, sweating, nausea, and vomiting may be present. But in shock due to haemorrhage in dogs who had lost twenty-five per cent of their blood, capillary tone was preserved and permeability to certain substances was maintained. This is because in simple haemorrhage the sequence of events is so dramatic that the subject is either rapidly killed or blood pressure is restored by an energetic treatment. One theory of death from haemorrhage was that it was a kidney anoxæmia, but
such a death results in general tissue anoxia at a time when damage to the kidney by local anoxia is slight. So it is seen that the prime factor in the mechanism of shock due to haemorrhage is a generalized tissue anoxia, for which compensation occurs via the above mentioned steps.

Symptoms and Signs
1. There is an appearance of pallor.
2. A cold, moist or sweaty skin.
3. A rapid regular thready pulse.
4. Rapid, shallow respiration, sometimes sighing.
5. Restlessness and appearance of anxiety.
6. Perhaps thirst.
7. Variable amount of nausea and perhaps vomiting.
10. Low and falling blood pressure.
11. A lowered metabolism.

Treatment
Primarily, all bleeding must be stopped. Intravenous infusion of saline may help, but whole blood transfusion is the most effective treatment available. The patient should be placed in comfortable surroundings and kept warm. Elevation of the foot of the bed may be advantageous. Drugs, such as ephedrine, may be used but only raise the blood pressure temporarily. In some cases the administration of oxygen may be helpful.

The transfusion of whole blood does more to cure this type of shock than all other measures put together. (Homans.²)

Discussion
In the recent literature it seems that many authors do not differentiate between shock due to haemorrhage and shock due to other causes. However, Harkins maintains that if certain variable amounts of blood be removed from a subject, the point would be reached where transfusion of blood with even more than was removed, would not save the subject. He points out that Dr. Moon³ does not mention this fact.

However, in shock due to haemorrhage treatment with whole blood is necessary as compensation is so slow—two to three days. While in other forms of shock, just restoring the fluid content will be efficacious.

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Wound Healing

By E. W. Kierluk

The process of healing is fundamentally the same in all wounds, but there are marked quantitative differences, depending on the amount of tissue destruction and to a certain extent on the presence of sepsis.

The treatment of wounds, in general, aims at securing, in a minimal period, sound healing without the occurrence of any infection or other complication.

Changes Occurring in Wounded Tissue

Hughes describes three changes occurring in wounded tissue:

1. DISRUPTION. The amount of disruption depends upon the nature of the disrupting object and upon the force with which it acts. Disruption of muscle results in their fasciculi being forced apart and deprived of their blood supply. It frequently extends over a considerable distance from the wound and the tissues so affected make an excellent medium for anaerobic microorganisms.

2. REACTIONARY EDEMA. Soon follows disruption. There is an outpouring of lymph into the spaces in the disrupted tissues so that the parts swell. In cases of disrupted muscles of a limb, tension beneath the deep fascia may become so great as to jeopardize the circulation. The tissues are contaminated at this time, but as yet not visibly infected. The interval between contamination and the appearance of evidences of infection is commonly known as the “time lag” or the “golden period” (Moorehead). Proper surgical treatment during this period results in the best healing. Treatment should be given in the first six or twelve hours before visible signs of infection develop.

3) VISIBLE INFECTION—In a matter of hours the stage of reactionary edema passes imperceptibly into that of visible infection. The swelling increases to such an extent that often edematous muscle will be seen protruding from the wound. This protrusion produces a “stopper effect” in an opening which is already inadequate, and further impedes the escape of inflammatory products.

It is convenient to consider healing in two very different types of wounds:

(a) Healing in a Clean Incised Wound (primary union),
(b) Healing in an Open Wound (healing by granulation).

(1) In a clean incised wound the cut surfaces are brought together by sutures, so that the healing process is direct, with no intermediary
substance playing a part. There is no appreciable loss of substance, bleeding is at a minimum, infection is absent, and if the wound edges are brought into apposition there is hardly any exudate between the surfaces. Although the wound is strictly aseptic, it is not bacteriologically sterile, and Staph. albus may be present in small numbers. This tends to favour rather than retard healing.

As a rule, incised wounds produced by knives, axes and similar objects do not require debridement or excision of the wound edges, as there is a minimum of damaged tissue, primary union will take place provided the wound is cleaned, sutured and dressed.

In the treatment of incised wounds seven essentials must be attended to if healing by first intention is to be obtained:

1. The arrest of all hemorrhage. General oozing may be arrested by firm pressure of dressings directly over the wound. Divided arteries and veins are ligatured.

2. Sterilization of the wound and its surroundings. The wound, though cleanly cut, is made through dirty skin, and portions of clothing, dirt, wood or glass splinters may be carried in. In these cases the wound and its surroundings must be thoroughly purified. As a universal antiseptic, dettol fulfills most demands and may be used on the surface, in the wound and on instruments.

3. Coaptation of the opposed surfaces by means of sutures. This should be carried out after sterilization of the wound.

4. Drainage. If necessary, drainage must be provided in order to guard against irritation and tension caused by retained blood clot or exudation. It is in the badly lacerated or crushed wounds that drainage is mostly required, but 24 to 48 hours is sufficient in clean incised wounds. A strand of horse hair or a strip of sterilized glove will suffice for small wounds. An india rubber tube answers well in the more extensive wounds. The sulphonamide drugs may be used without drainage.

5. All fresh sources of irritation and infection of the wound must be excluded by some form of antiseptic or aseptic dressing.

6. Rest to the injured part must be secured by such an arrangement of splints, slings, or bandages as may be necessary.

7. The general health of the patient should be maintained at the highest possible level.

In a clean incised wound there is a minimum of disruption, reactionary edema, and infection. There is usually bacterial contamination of the wound but the organisms are present in such small num-
bers that they are unable to multiply and so cause a visible infection of this wound. Moreover, since there is a minimum of tissue damage, these wounds can probably be adequately treated at the advanced dressing station rather than farther back at the casualty clearing station or field hospital. The patient is thus brought to treatment earlier and also has been less exposed to medical attendants who are a likely source of contamination. The average patient who is brought back to the casualty clearing station has been in contact with a total of 433 people. It has been established that seven per cent of all individuals harbor naso-pharyngeal streptococci and almost four per cent of the population carry streptococci on the skin. Therefore, of the 433 persons in contact with the casualty, 45 or about one-tenth could contaminate the wound by droplet infection or by handling the dressings. Under civil conditions, of course, the source of contamination is much more limited.

Therefore, in civil practice and under ideal military conditions a cleanly incised wound receives a minimum of handling and so, although contaminated to a small degree, the wound is less liable to become infected.

This type of wound may be closed by primary suture and good healing may be expected. The sprinkling of a powdered sulphonamide drug into the wound is an adopted further protective measure against infection of the wound.

**Healing in an Open Wound**

The treatment of this type of wound is of special significance at the present time because of the large incidence of extensively traumatized wounds encountered among war casualties. These wounds are further complicated in a large percentage of cases by fracture of the underlying bone. The treatment is essentially surgical and the essence of treatment is excision of the tissue lining the tract of the wound. Minimal treatment should at least consist of debridement.

There has been a tendency to use the two terms, debridement and excision, synonymously. Morrison urges the segregation of the term debridement from wound excision. *Wound excision* is a meticulous process, often time consuming and is carried out in the first few hours after the infliction of the wound; that is, before the lesion has become infected and shows inflammatory changes. Every particle of bruised and potentially infected tissue must be excised with a sharp knife. All foreign particles such as bits of clothing, metal, or other contaminated objects must be removed. *Debridement* simply implies enlargement of the wound in order to effect free drainage, combined with the rapid removal of foreign bodies and patently dead tissue. It is the only local
treatment permissible when twenty-four hours have elapsed since the infliction of the wound.

In order that he may decide on the best treatment for a particular case, the surgeon must be able to differentiate healthy muscle tissue from that which is infected and of low vitality or viability. Treatment will depend upon whether the wound is in the pre-inflammatory stage or is visibly infected.

War wounds are nearly always deeply and severely contaminated at the time of the infliction. The projectile is jagged, the skin is dirty, and clothing and other foreign matter is carried into the wound. Given time, dangerous infection is inevitable. Before infection occurs the muscles are a healthy red color, contract when pinched, and bleed freely when cut. This is during the period of contamination and it is during this period that excision can be undertaken safely. In general, the period of contamination is twelve hours though after six hours infection by hemolytic streptococcus may have got out of hand.

When the surgeon sees muscle tissue that is a brick red color (anaerobic infection) which has lost its ability to contract when pinched and which does not bleed when cut, he should realize that the time when excision could be performed safely is past. At best, he may do a debridement. This involves an examination into the depths of the wound through a free incision, the removal of foreign bodies of all sorts including bone fragments completely separated from their blood supply, and the removal of blood clot and the ligation of bleeding vessels.

**Excision of a Wound in the Pre-Inflammatory Stage**

1. One-quarter inch margin of skin around the wound is ample.
2. The deeper parts should be exposed by longitudinal incision above and below the skin wound.
3. Transverse division of injured skin and muscle should be avoided.
4. The wall of the wound track, including all damaged tissue, should be removed with a sharp knife, but injury to important vessels and nerves should be avoided.
5. Healthy muscle contracts and bleeds when cut. A brick red color may indicate early anaerobic infection.
6. No tabs of muscle, fat or fascia should be left.
7. When possible, the removal of bone fragments still attached to periosteum should be avoided.
8. Viable tissue must be in juxtaposition on either side to permit healing.
9. Guillotine amputations are not to be made.
10. The use of the gauze "pull through" in the wound track is to be avoided.

11. Any foreign body should be removed only through the enlarged track of its own wound. Separate incisions are not advisable.

**Principles of Operative Technique in Wounds Already Visibly Infected**

1. On no account must wound excision be attempted after 18 hours. During the first six hours is the most opportune time.

2. Operative treatment should be limited in scope and gentle in execution.

3. Incision may be required for access to the depths to permit drainage.

4. Blood clot, foreign bodies and obviously devitalized tissues must be removed without danger to the living walls of the wound.

5. Hemostasis must be accomplished.

6. Damaged muscle must be excised up to the point where contractile bleeding muscle is reached.

7. Irrigation with saline or weak hydrogen peroxide is essential.

8. Free drainage is imperative and is best secured by lightly packed vaseline gauze carrying one of the sulphonamide group as an ingredient, or in the large deep wounds by Carrel-Dakin technique for hypochlorite irrigation.

**Common Errors in Wound Excision**

1. Undue sacrifice of skin.

2. Unnecessary transverse section of skin and muscle to join entrance and exit wounds.

3. Inadequate exposure of the depths of a wound.

4. The use of a "pull through" of gauze instead of proper exposure and excision of muscle.

5. Removal of foreign bodies through a separate incision instead of following the wound track.

**Surgical Treatment Indicated in Various Types of Wounds**

(1) Primary closure of simple lacerations or wounds treated less than eight hours after injury, without obvious tissue damage or soiling that warrants excision of the wound.

The wound is mechanically cleansed and then thoroughly irrigated with saline. It is then powdered with sulphathiazole and is closed by primary suture.

(2) Primo-secondary suture (Moorhead); delayed primadry closure
WOUND HEALING

(Reid-Carter) of wounds treated after a lapse of eight hours, probably but not certainly infected.

The wound is cleansed as for primary suture. Severed fascia is brought together by a few silk sutures, the ends of which are long enough to be brought out over the wound edge. Skin sutures are placed but not tied.

S-ilamide is liberally powdered into the wound which is then packed with gauze with 1:3300 solution of azo-chloramide-saline and covered with gutta-percha or cellophane to keep it moist. The wound is then immobilized for 24 to 48 hours. If at that time the wound is quiet the fascial sutures are cut close to the knot. More sulphanilamide is powdered into the wound and the skin sutures are tied. Immobilize the wound and treat it as if the suture had been immediate. If the wound is infected remove the fascial sutures, fill the wound with packing and again immobilize and encourage healing by granulation and possibly skin grafting later.

(3) Primary Closure of Contaminated, Bruised and Grossly Soiled Wounds after Excision or Debridement.

These wounds are shock breeders because of greater loss of blood and greater tissue damage. Plasma or blood should be administered.

After satisfactory excision the wound has been converted into a scarcely contaminated laceration and, after irrigation, it may be closed by primary suture as in the early primary closure of simple lacerations. If the wound is large it should be left open and healing by granulation should be encouraged.

(4) Infected Wounds (Wounds treated later than eight hours after injury). Thorough debridement is carried out. All recesses are completely exposed. No attempt is made at closure. All parts of the wound are dusted with s-ilamide powder and packed with vaseline gauze. The wound is then covered with a gauze dressing and immobilized.

(5) Deeply Penetrating Wounds caused by Glass Fragments, Bullets and Other Substances.

Treatment depends on the location of the wound on the body. Penetrating wounds in the head and trunk call for appropriate treatment. In the extremities it may be advisable to excise the wound track, to remove all foreign bodies, to irrigate the cavity and occasionally to close the wound. Most wounds are laid open, debridement done, and the part immobilized in plaster.

Immobilization

(1) Packing in the wound itself. This method lends support to the
immediate tissues. It prevents localized tissue edema and the filling of the wound cavity with exudate which causes a delay in healing.

(2) Splints of various types. It has been found that various splints which have been employed in wound immobilization have not proved entirely satisfactory. Absolute rest of the involved extremity is essential for the best results and the commonly used splints do not assure this.

(3) Closed Plaster Method of Immobilization—In 1929, Orr recommended the complete rest of the part through immobilization of the limb within a plaster encasement, in the treatment of osteomyelitis. He found that this method prevented the spread of infection, did not interfere with the body defence mechanisms, and that healing was more rapid and complete.

Trueta, during the Spanish War, followed Orr's principles of treatment and in 1939 reported the results of the treatment of 1,073 patients with compound fractures of long bones. There were only six deaths in his series, a mortality of 0.1 per cent. He believes that complete rest of the extremity allows venous and capillary thrombi to form, thus preventing the spread of infection. As the plaster is left on for periods of from two to six weeks, new capillaries are not torn by repeated dressings of the wound, and the plaster encasement maintains a constant beneficial pressure on the wound. In this method of immobilization the plaster is applied directly to the skin. The only padding used is over bony prominences. The wound itself is lightly covered with a gauze dressing and the plaster is applied directly over it. Plaster extends to the joints above and below the point of injury. A window is not cut over the wound as this would disturb the uniform pressure that is exerted over the affected limb by the cast. This method is of extreme value in the treatment of war casualties because it allows the patient to be moved without the danger of mobilizing the wounded extremity. It produces a lymph stasis in the limb and thus diminishes the absorption and spread of bacteria and their toxins. One serious objection to plaster is that it leaves the patient with a wide open wound which must heal by granulation over a period of weeks or months.

This method is contra-indicated in wounds that are visibly infected or in wounds that have not been thoroughly excised or debrided.

**Carrel-Dakin Treatment**

This treatment is advisable in those cases in which wound excision has been incomplete. This method fails to provide both tissue support and appropriate immobilization of the injured part, but has the advantage of encouraging wound drainage. It may be used when it is known that dead tissue will have to separate.
WOUND HEALING

Drainage

Its purpose is to provide an outlet for blood, secretions, dead tissues and pus, and thereby to assist in abolishing dead spaces and to prevent or clear up infection.

Wounds Which Require Drainage

All cases already infected and where there is necrotic tissue present require drainage; also those where infection is strongly suspected as indicated by the local or general features (clinical) or by the lapse of over six hours of time.

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Chest Injuries

By Patrick N. Kenny

Chest injuries may be divided into those due to—

(1) Penetrating wounds,
(2) Non-penetrating wounds.

The knowledge of chest injuries and their treatment is of utmost importance, particularly in times of war. In this article the more important types of chest injury will be discussed.

(1) Open Pneumothorax

Wounds of the chest wall which penetrate the pleural space may afford a constant open communication between the pleural space and the atmosphere. Such a wound results in an immediate contraction of the lung by virtue of its elasticity and the obliteration of the intrapleural negative pressure. The serious effect of such a phenomenon is the pendulum-like action of the mediastinal structures which does not allow the right side of the heart to fill adequately. Consequently, with an inadequate cardiac intake, cardiac output is inadequate. Associated with open pneumothorax is grave shock and dyspnoea. An open pneumothorax is obvious on examination as blood and air are sucked into, and escape from the wound during respiratory movements.

Treatment: The underlying principle of treatment is to effect an air-tight closure of the wound or wounds.

(2) Tension Pneumothorax

This is a form of valvular pneumothorax and is due to laceration of the lung or bronchi. It may be of the closed or open type, depending on whether air enters the pleural cavity via the trachea and bronchi through a tear in the visceral pleura and alveoli (closed type), or whether the air enters through an opening in the chest wall (open type).

In this condition there is a continuous escape of air into the pleural cavity. Air enters the pleural cavity on inspiration but does not escape on expiration due to a valve-like action of the tissues surrounding the laceration. Therefore, the amount of air in the pleural cavity increases and the lung collapses correspondingly. Finally, the intrapleural pressure may be equal to the atmospheric pressure. As a result, the heart and mediastinal structures are displaced to the opposite side. This results in interference not only with the respiratory functions but with cardiac action because of the pressure on the right side of the heart and great veins. There is considerable dyspnoea associated with a high note on percussion. Signs: diminution or absence of breath sounds; displacement of cardiac apical impulse toward the opposite side.
TREATMENT: Inserting a short wide-bore needle through the chest wall into the pleura affords rapid relief. The puncture is usually done in the second interspace anteriorly two inches from the edge of the sternum. If air escapes into the pleural space rapidly and continuously it is best to leave the needle in situ and connect it by tubing to a water-seal bottle.

(3) Simple Hæmothorax

Hæmothorax may complicate any chest injury and occurs in various degrees in 70 per cent of chest injuries in warfare (H. Morriston Davies). It may be the result of penetrating or non-penetrating chest wounds. The blood arises either from the intercostal artery, capillaries in lacerated lung tissue, the internal mammary artery, vessels at the hilum of the lung, or from the vena cava. It must always be borne in mind that the blood in a hæmothorax may arise from the liver. This may occur in abdomino-thoracic wounds where both the pleural cavity and diaphragm are traversed and the liver is penetrated. It must be remembered also that bleeding from the lung parenchyma, per se, is rarely fatal because the pulmonary circulatory pressure is lower than that of the systemic circulation and as the lung collapses the wound in it tends to become closed. In non-penetrating injuries, the hæorrhage is usually the result of a fractured rib tearing either the lung parenchyma or an intercostal artery.

Injuries which cause hæmothorax may be fatal because of shock or associated damage to other organs, but hæmothorax itself causes death for three reasons, namely—

(i) loss of blood,
(ii) compression of the lungs and main vessels,
(iii) sepsis supervening later.

A loss of 1700 cc. of blood into the pleural cavity is sufficient to cause unconsciousness and death. Associated tears in a bronchus and especially valvular tears may cause immediate death from compression. The importance of taking repeated pulse-rate and pressure readings and of noting alterations in the position of the apex beat has been emphasized. Bleeding may recur after a patient has been moved, i.e., by further injury from a fractured rib. Also rises of blood pressure after anti-shock treatment may reinitiate hæorrhage from the bleeding organ. Twenty-four hours after a hæmothorax, it is often complicated by effusion which is brought about by pleural irritation from the blood. Under tension, such an effusion can cause a morning and evening elevation of temperature accompanied by a few constitutional symptoms. The temperature drops on relief of the tension.

TREATMENT: Aims at saving life and restoring as nearly as possible the normal functions:
(1) anti-shock treatment
(2) after shock is controlled, the cause of hæmorrhage must be ascertained as well as the extent of associated injuries.

Six measures are necessary, namely:
(1) Blood transfusion
(2) Relief of intrapleural pressure
(3) Excision of wound and rib splinters
(4) Ligature of bleeding arteries
(5) Insufflation with sulphanilamide powder
(6) Suture in one layer.

It is stated that not until the patient has recovered from his loss of blood should the complete irrigation be done. A hæmothorax not endangering life should be washed out with saline in 24 to 48 hours after its onset and then the saline is replaced with air.

(4) Infected Hæmothorax

Infection of a hæmothorax influences the mortality rate of wounds of the chest, the period of illness, and the chances of restoring complete health (J. Howell Hughes).

Origin of the infection:
(i) from the lung, the lung tissue being devitalized by damage from a foreign body or hæmorrhage;
(ii) from the chest wall, where excision of infected wounds has been too late or inadequate;
(iii) from foreign bodies;
(iv) from the blood stream as part of a general infection;
(v) carelessness regarding asepsis during treatment.

Bacteriology—Staphylococcus, Streptococcus, Pneumococcus, and rarely anærobic organisms.

Infections may set in in a few hours or may be late—two or three weeks after the primary trauma. Early diagnosis is of the utmost importance. In the discussion of simple hæmothorax, it has been stated that there may be a morning and evening rise of temperature, hence, the clinical picture is by no means diagnostic. However, an increase of the pulse rate and a leucocytosis are suspicious. But the only positive means of diagnosis is by aspiration of the pleural fluid, which, when infected, is often purplish and has an offensive odour. Organisms are also found in a direct smear of the fluid.

TREATMENT: As soon as a diagnosis is established, treatment must be instituted, and it consists of evacuation of the fluid. This should be
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Carried out by adequate tube drainage of the pleural cavity preferably by the closed method. J. Howell Hughes does not agree with this method of treatment and says it is to be avoided. He contends that by using "continuous suction drainage" there is usually an air leak into the pleural cavity which produces a total empyema. He thinks, that once the pus becomes thick, open drainage should be instituted by resection of a rib—the site of resection depending upon the position of the pus. The opening in the chest wall is not allowed to close until complete obliteration of the empyema cavity has been confirmed by radiography with Lipiodol.

(5) Emphysema

Subcutaneous or mediastinal emphysema, or both, may be closely associated with tension pneumothorax.

(a) Superficial Surgical emphysema

This results from air escaping into the superficial tissues (i) from laceration of the lung by in-driven rib fragments or (ii) from penetration of the lung by a missile. Air escapes into the subcutaneous tissues and causes swelling of the superficial tissues and crepitation on pressure. When the condition is extensive, air may spread up into the face and neck and down over the abdominal wall and into the scrotum or labia. Superficial surgical emphysema may or may not be associated with pneumothorax depending upon whether or not the lung is adherent to the parietal pleura from previous disease.

TREATMENT: The majority of cases require no treatment and in the course of a few days the air is absorbed. When the condition is progressing, and is causing symptoms, a large needle should be introduced into the subcutaneous tissues, and then the air is massaged towards the needle through which it escapes.

(b) Mediastinal emphysema

This usually results (i) if laceration of the mediastinal pleura is associated with tension pneumothorax or (ii) if the distal portion of the trachea or the proximal portion of a primary bronchus is lacerated. Consequently, air escapes into the mediastinum which sometimes causes obstruction to the large veins, interference with respiration or deglutition. Swelling of the neck, face and upper portion of the soft tissues of the chest wall results. When the laceration in the bronchus is large and the escape of air into the mediastinum rapid, death results quickly.

TREATMENT: In cases of mediastinal emphysema, when the patient is getting worse, thoractomy may be advisable and hence the mediastinal pleura may then be incised. This permits the imprisoned air to enter the pleural cavity from which it can escape via an intercostal tube. Any obvious bronchial or tracheal laceration should be sutured.
(6) Blast Injury

It has been found that grave pulmonary damage sometimes results from the bursting of a bomb. This is called blast injury to the lungs. Sudden death often results from such injuries and consequently early diagnosis must be made if treatment is to be effective. Also, recognition of these cases is important for, if operation is necessary, the type of anaesthetic chosen will be most important, *e.g.*, inhalation anaesthetics may be too irritating; so local anaesthetics would be the choice. However, if local anaesthesia were not feasible, it may be combined with gas and oxygen anaesthesia. Experimental work on animals by Zuckerman has demonstrated the fact that pulmonary blast injuries are produced by the compression wave upon the chest wall. Post-mortem examination in these cases reveals numerous widespread bilateral pulmonary haemorrhages—on the pleural surfaces, cut surfaces of the lung, submucous points of haemorrhage in the trachea and bronchi, and blood on the surface of the mucose. Microscopic examination shows intense focal capillary dilatation with exudation of fluid into many alveoli. There may be also a few red blood cells in the alveoli and in small bronchioles.

**DIAGNOSIS** may be made if blood-stained fluid appears in the nose or mouth without apparent cause, or if the individual expectorates frothy, blood-stained sputum. Also, it should be noted if physical signs develop in the chest, if the respiratory rate is increased, and if the degree of shock is in the proportion to the external injuries. If the above observations are carefully recorded, it may be possible to make a diagnosis or at least to suspect the presence of the condition.

**TREATMENT:** Avoid operative intervention and open anaesthetics. Concentrate on the treatment of shock by morphine, oxygen and possibly plasma transfusion or transfusion with concentrated serum.

(7) Stove-in Chest

It is the result of fracture of several adjacent ribs in at least two places, either anteriorly and laterally, or anteriorly and posteriorly, etc., and is caused by a severe blow on the chest. As a result of such an injury, a portion of the chest wall is not stable and consequently paradoxical respiration occurs. This must be corrected immediately or serious interference with respiration may result. The unstable portion of the chest wall tends to react in an exactly opposite manner to the normal portion and, as a result, the volume within the chest on inspiration and expiration is not greatly altered and air will neither enter the lung nor be expelled properly. Also, the negative pressure created on the uninjured side on inspiration pulls the mediastinal organs towards the good side and on expiration the reverse occurs. During such paradoxical respiratory movements, the same air may move back and forth from the paradoxically moving lung to the good lung. The amount of air, that
goes back and forth between the lungs, depends upon the amount of paradoxical movement and the chest wall and the amount of mediastinal shift. This type of respiration causes marked dyspnœa.

TREATMENT:

(1) Morphine in doses large enough to control pain;
(2) Anti-shock treatment;
(3) Oxygen;
(4) Light sand bags or a tight dressing may be applied to the affected region;
(5) When the diaphragm is involved, adhesive placed at the costal margin level should completely encircle the chest;
(6) A tight adhesive band applied in expiration around the injured side of the chest. It should extend for three inches on to the opposite hemithorax, both anteriorly and posteriorly.
(7) Use of a Drinker respirator which will decrease the paradoxical motion of the chest.

(8) Traumatic Asphyxia

ETIOLOGY—Sudden, violent, thoracic compression causes a wave of back pressure by way of the Superior Vena Cava dilating the peripheral veins. This is followed by venous stasis and loss of vascular tone, petechial haemorrhages are frequent. In these war times, it is seen not only among the troops, but even more frequently in civilians as a result of bombing, since persons may be trapped under heavy pressure by falling timber and masonry.

Signs and Symptoms

This condition is characterized by an unusual swelling and purplish-blue discoloration of the soft tissues of the upper portion of the chest and extending up into the neck and face with oedema, particularly of the eyelids and lips. It is of interest to note that the discoloration is not due primarily to the extravasation of blood. This is proved by the fact that, in the process of clearing, the region does not go through the characteristic color changes which occur after a blow has been sustained in the region of the eye (H. K. Gray). It has also been proven microscopically not to be extravasation, but marked venous congestion characterizes the microscopic picture.

TREATMENT: Morphine at once—absolute rest. Head and shoulders to be somewhat elevated. Oxygen may be of help.

PROGNOSIS: If death does not supervene at once, recovery is probable.

(9) Cardiac Tamponade

May occur in injuries of the thorax. Following injury to the heart muscle or intrapericardial vessels, haemorrhage into the pericardial
sac may occur. If fluid in the pericardial sac increases beyond about 200 cc., cardiac embarrassment ensues and may continue to the point where life is no longer possible. The auricles and vena cavae and finally the ventricles are compressed. The venous pressure rises and the arterial pressure falls. Inadequate oxygenation of the circulating blood occurs and serious cardiac tamponade results.

*Signs and Symptoms:* Cyanosis, moderate shortness of breath, dyspnœa, or stertorous respirations depending upon the degree of tamponade, small thready pulse, low arterial pressure, high venous pressure, engorged neck veins, and sometimes venous pulsations. Cardiac pulsations are faint or absent over the pericardium. Cardiac dullness is not necessarily much increased.

*Diagnosis* is not difficult when its possibility is considered and is made from the history, symptoms, and physical findings. Fluoroscopy will usually establish the diagnosis with certainty—a cardiac shadow is seen which is little larger than normal and with little or no evidence of pulsation.

*Treatment:* Immediate aspiration of blood from the pericardium is imperative. It is suggested by Dolley and Brewer to insert a 15-gauge needle into the left costophrenic angle (subcardiac approach). If Tamponade recurs after aspiration, the pericardial sac should be explored and any source of haemorrhage controlled.

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The Vomiting of Pregnancy: A Review

By Marion G. Webster, B.A.

The so-called vomiting of pregnancy occurs in approximately one-half the number of all pregnant women, usually appearing about the sixth week and disappearing spontaneously six to eight weeks later. The patients suffer from nausea or vomiting shortly after rising, hence the term “morning sickness”. In other cases, the vomiting occurs at different times and at more frequent intervals, occasionally lasting for a longer period, while exceptionally it becomes so frequent and severe as to endanger the life of the patient. In the latter circumstance, it is designated pernicious vomiting, or hyperemesis gravidarum. According to Pick, pernicious vomiting occurs about once in every 1,000 pregnancies.

Formerly three clinical types of this condition were described: (1) the neurotic type, found particularly in women of a nervous temperament in whom treatment by sedatives and by “suggestion” might stop the vomiting; (2) the toxæmic type, where the only cause was presumed to be a toxemia, and which in its fully developed form responded to no form of treatment other than the termination of the pregnancy; and (3) the reflex type, where there was some local lesion, such as retroversion or exaggerated anteflexion of the uterus, the correction of which brought relief to the general condition. Pelvic abnormalities of this type, however, were often present without the patient suffering from even morning sickness. The tendency today is more and more to think of all cases as having a common origin on a toxæmic basis, and to separate them into two main classes, mild and severe, depending upon the signs and symptoms.

Etiology:

Since morning sickness occurs in approximately every second pregnant woman, it may be assumed that the cause of vomiting in general must be sought in some factor commonly present in normal pregnancy; and consequently that pernicious vomiting is due to an increase in the amount or in the potency of that factor, or to decreased resistance to its action on the part of the woman. The vomiting of pregnancy may be called a “disease of theories” as the underlying factor remains unknown. It is evident that age, weight and parity of the patient bear no relation to the severity of the nausea and vomiting.

Various theories have been postulated, each with clinical data for its support:

1. **The Psychic Factor**: No doubt as in other clinical conditions that physicians are called upon to treat, the psychic element may be a factor, but this is difficult to evaluate. To assume that the majority of pregnant women are neurotic and that the vomiting is psychic is a
diagnostic habit that is akin to classifying as "neurasthenia" all physical conditions that cannot be easily diagnosed. It is believed that every case of vomiting of pregnancy rests upon a toxemic basis, and that variations in its course depend upon the severity of the underlying toxæmia. In occasional cases, the toxic element is predominant, when we have to deal with pernicious vomiting. In the great majority of cases this factor appears to act merely as a predisposing cause in neurotic women, and becomes negligible after the nervous equation has been controlled. Kaltenbach, in 1891, stated that vomiting of pregnancy is usually a manifestation of a neurosis, somewhat allied to hysteria, and is readily amenable to psychotherapy. The chief argument in favour of the psychic element is afforded by the surprising regularity with which cure can be effected when suggestive means are intelligently employed, which seems to indicate that, once the abnormal neurotic tendency has been overcome, the organism can cope with the underlying factor.

2. CARBOHYDRATE DISTURBANCE: Harding, Titus and his associates and Dieckmann and Crossen attribute the symptoms to depletion of the glycogen stores of the liver. One of the functions of the placenta is to store glycogen for the growing foetus until the foetal liver is able to store its own reserve of carbohydrate, and during this period it is the glycogen of the maternal liver upon which the foetus draws for its supply. At the end of the third month, the time vomiting ordinarily ceases, the foetal liver is formed and is able to store its own glycogen, and then, in ordinary circumstances, the drain on the maternal liver should cease. The lowering of the glycogen reserve of the maternal liver may be great enough to cause the vomiting to continue, which in turn produces dehydration and reduction in carbohydrate intake. A vicious circle is then established—vomiting, starvation, ketosis. The ketosis which is so prominent a factor in the last stage of pernicious vomiting is not only a result of the intolerance of the stomach for food, but tends to increase that intolerance and so prolong the nausea and vomiting.

The blood sugar in vomiting of pregnancy does not seem to be greatly changed. Dieckmann and Crossen reported blood sugar values within normal limits. Peckham found a slight hyperglycaemia in certain severe cases. Titus and Harding independently observed low values, and they regarded hypoglycaemia as an etiologic factor in the disease. It would seem, however, that the changes from the normal values are rather the result of the vomiting and under-nutrition, as carbohydrates are the first to be sacrificed in any form of starvation, protein being spared to the last.

3. ENDOCRINE DYSFUNCTION: Finch attributes the symptoms to a sensitization of the patients to the luteinizing hormone of pregnancy,
and feels that he can predict before the onset of pregnancy which patients will have nausea by testing their sensitivity. He also claims good therapeutic results by a desensitizing regime. Other observers feel that there is present an excess of this hormone, and attempt to treat the condition by the administration of another and antagonistic hormone, while a third group work upon the theory that the hormone is deficient in amount and use replacement therapy.

Not only have the sex hormones been theoretically implicated in vomiting, but also disturbances of the thyroid and parathyroid glands. Sussman claims that parathyroid extract with calcium is of distinct value in controlling the early nausea and vomiting of pregnancy. Titus mentions that in a few cases lowered activity of the thyroid with a low metabolic rate is a contributory factor and should be treated by the administration of thyroid substance.

According to Kemp, there is present in the maternal blood a “toxic metabolite” which results from a temporary relative insufficiency of the secretion of the vital adrenal cortex. The therapeutic use of adrenal cortex in hyperemesis gravidarum was suggested in accordance with the following clinical and experimental data:

1. The maternal adrenal cortex always undergoes hypertrophy during pregnancy.
2. The first signs of adrenal cortex insufficiency in adrenalectomized animals are nausea and vomiting.
3. The first signs of Addison’s disease are aversion to fatty foods and morning vomiting. Banting and Gairns have shown that in the presence of this insufficiency of the cortico-adrenal secretion, the liver bears the brunt of the pathological changes resulting from this disturbance in body chemistry, while degenerative changes also occur in the kidneys. Frankel, in discussing the pathological findings of two fatal cases of pernicious vomiting of pregnancy, has shown that the changes were demonstrable in the adrenal cortex, liver and kidney in each case.

Kemp postulated that the liver only exercises its functions in the presence of an adequate supply of a catalyst or autacoid (possibly several) which is a secretion of the adrenal cortex. In the absence of this secretion, death is inevitable. When there is only a partial insufficiency, as in early pregnancy, there occurs an incompleteness of liver function and the consequent presence of varying amounts of toxic metabolites in the blood stream. As in the victims of Addison’s disease, the presence of these toxic metabolites results in simple “morning sickness” or in severe vomiting according to the degree of the insufficiency.

Since all these writers claim equally good results and since their methods of treatment are so diametrically opposed to each other, the
unbiased observer is forced to the conclusion that the final word remains to be said and that the results claimed are probably due, in most instances at least, to psychotherapy.

4. AVITAMINOSIS: It has been repeatedly observed that the deliberate ingestion of food materially lessens the early nausea and vomiting of pregnancy. Willis, Morris and Massey, with this thought in mind, attempted to create a desire for food by the administration of Vitamin B₁ or B₆ to all patients who complained of any degree of nausea and vomiting in the first trimester of pregnancy. They found it difficult to conclude whether Vitamin B maintains the desire to eat simply by aiding in the preservation of the normal gastric tone, or whether the marked systemic manifestations characteristic of advanced cases of Vitamin B deficiency suggest that the loss of the desire to eat in such cases is due as much to a generalized systemic disturbance as it is to an abnormal condition localized in the alimentary canal. It seems that the avitaminosis may be a primary factor due to dietary deficiency, or a secondary factor due to vomiting. Willis, Morris and Massey in their series of cases found that almost complete relief from nausea and vomiting was obtained by administering Vitamin B in varying doses at irregular intervals by either the intra-muscular or intravenous route. They claimed that more complete relief was gained from the use of Vitamin B₆ than Vitamin B₁. Strauss and McDonald, Leukart, and Plass and Mengert have reported cases successfully treated by administration of Vitamin B in the form of brewer's malt or yeast. Extract of rice polishings is now available commercially, and it is a potent source of Vitamin B.

Vitamin C may also be lacking as signs such as bleeding, spongy gums, hematuria, periostitis, retinal hemorrhages may appear.

Signs and Symptoms:

Morning sickness starts with a feeling of nausea in the morning. There may be expelled some undigested or partly digested food. Although the patient is unable to retain her breakfast, by noon she has completely recovered and remains so until the next morning. There is only slight loss of body weight and there are no other indications of toxæmia. This continues from one to three weeks and then suddenly ceases. The majority of patients suffering from vomiting of pregnancy fall into this group.

In a small number of cases the patient continues to vomit, two, three or more times through the day, and may eventually be disturbed during the night. She complains of severe epigastric pain, and of pain in the ribs, due to excessive retching. The patient loses her appetite and the stomach becomes intolerant to liquids as well as solids. The vomitus is at first composed of bile and mucus, but later has the
appearance of "coffee grounds" from the presence of altered blood. The urine is scanty and highly-coloured and contains albumen, casts, bile, acetone, diacetic acid and sometimes glucose. The patient loses weight up to 20 or 30 lbs. The skin becomes pale, dry and shrunken with a definite yellow tinge which may develop later into deep jaundice. The abdomen becomes scaphoid, and there is great tenderness over the stomach and liver. The tongue and lips are dry and cracked, the gums are covered with sores. The breath has a heavy odour of acetone. The temperature may be subnormal, but pyrexia up to 101° may occur. The behaviour of the pulse is not constant; in some cases it soon becomes rapid and thready, while in others it is scarcely accelerated. Hemorrhagic retinitis is regarded as a grave sign.

**Clinical Course**

Ordinary "morning sickness" usually disappears spontaneously six to eight weeks after its onset. The severe type of vomiting may be either acute or chronic. In the former the patient pursues a rapid fulminating course and dies within ten days without marked emaciation. In the latter and more frequent variety, persistent vomiting may continue for weeks and eventually great emaciation occurs. In both types in the terminal stages, torpor or occasionally violent excitement, passing into coma, occurs.

**Diagnosis:**

In all patients a careful history and complete general, physical and pelvic examinations are essential. This should include a search for foci of infection in the teeth, tonsils, kidneys, gall bladder, etc., in order to rule out vomiting due to any of the ordinary pathological causes, e.g., gastric ulcer, strangulated hernia, chronic intestinal obstruction, cerebral tumor, chronic alcoholism, or the onset of an acute specific fever. One must also consider other conditions in pregnancy which may be associated with vomiting, e.g., pyelitis, hydatidiform mole, acute hydramnios. If any serious abnormality of the generative tract is detected, it should be corrected on the assumption that it may reflexly aggravate the symptoms. If no lesion can be detected, the diagnosis lies between vomiting in which neurosis plays a major part and toxemic vomiting without a neurotic element. The urinary and blood chemistry should be studied. If it is normal, it is probable that the vomiting is of the mild toxic variety with a superimposed neurotic element.

**Pathology:**

1. **Liver:** The post-mortem findings are most variable, and in many cases there is little or no obvious change. The typical lesion in hyperemesis gravidarum has been regarded as a central necrosis in the lobule surrounded by an area of fatty degeneration and then by a layer of healthy liver tissue. There may be only a series of small necrotic
patches in the centre of some of the lobules, while the bulk of the organ appears quite healthy. Where the necrotic changes are marked the histological picture resembles very closely that found in acute yellow atrophy of the liver—a central necrosis spreading from the centre of the lobule and regarded as characteristic of a systemic toxic process.

2. KIDNEYS: They may show no change, but there is sometimes a fatty degeneration of the first convoluted tubules.

3. PATHOLOGICAL CHEMISTRY: There are few phenomena which may be considered constant and characteristic. The most notable changes in the blood and urine are due to starvation rather than toxæmia. Owing to the shortage of carbohydrate the oxidation of the fats is incomplete and thus B-hydroxybutyric acid, diacetic acid and acetone circulate in the blood and appear in the urine. Bile may appear in the urine when necrotic changes occur in the liver. In severe cases, the blood shows an increase in the non-protein nitrogen, uric acid, urea, and amino and lactic acids, with a decrease in the chlorides. Blood sugar values may be normal, high or low. The carbon dioxide combining-power of the blood remains within normal limits as a rule.

Treatment:

1. MORNING SICKNESS: Encouragement and reassurance are the most valuable therapeutic measures. When the patient awakes in the morning or if she awakens during the night, she should have some light nourishment, such as a glass of milk or iced orange juice, piece of dry bread or cup of coffee with sugar. This will often be sufficient to cause the vomiting to cease. If not, she should be put on a high carbohydrate, low fat diet with adequate vitamins. Frequent light meals should be taken—six small meals rather than three heavy meals. The fluid intake should be adequate, not less than three pints per day. Care should be taken to secure regular bowel movement. Irregular habits of eating and living should be corrected. With a pleasant environment, plenty of good food and plenty of rest, most of these patients will recover.

2. EXAGGERATED MORNING SICKNESS: In these cases the vomiting is more frequent, there is no epigastric pain or jaundice, but the patient shows some degree of dehydration. She should be removed to a hospital and isolated from her relatives, whose excessive sympathy or even want of sympathy may be an adverse influence. She must be kept in bed, and all nourishment by mouth stopped for 24 to 72 hours, or until all vomiting has ceased. Nutrition is secured by giving 2,500 to 3,000 cc. of glucose as a 10 per cent solution per 24 hours intravenously. Normal saline may also be given. One of the principal reasons for rest appears to be its psychic appeal, and the patient is often told that it is important to "rest her stomach". She becomes quite uncomfortable from the dryness of the lips and tongue and when fluids are allowed by mouth it is
with the understanding that if vomiting occurs the "rest period" will have to be repeated. Occasionally hypodermics of sterile water have proven of benefit, especially if she were told that it was a rare, expensive drug, obtained only after much difficulty. Various forms of psychotherapy, some of them rather bizarre, have been advocated. A sedative such as bromides, luminal or chloral may be a necessary adjunct to the treatment. When the vomiting ceases, treat the patient as in 1.

3. Hyperemesis Gravidarum: In this condition there is continuous vomiting, marked dehydration and often epigastric pain and jaundice. The patient should be placed in a hospital immediately, and it is imperative that she receive an adequate amount of fluid in order to restore the water balance of her body. Ten per cent glucose and saline intravenously, and fluid administered rectally, are given. Sedatives are administered as required to secure absolute rest. If, in spite of active treatment, there is continued loss of weight with no definite cessation of the vomiting and with such signs and symptoms as increasing jaundice, coffee-ground vomitus, increased pulse rate, fever, hemorrhagic retinitis, and a somnolent or comatose state, interruption of the pregnancy becomes urgently necessary. The important point in these obstinate cases is to terminate the pregnancy before the patient's condition is so poor as to make interference dangerous. Therapeutic abortions delayed too long are not life-saving measures. However, to terminate the pregnancy is seldom found necessary.

The use of vitamins has been recently introduced into the treatment. For morning sickness, the patient should be advised to eat foods with plenty of vitamins. For the more exaggerated vomiting, intravenous injections of 25-100 mgms. of Vitamin B₁ should be given. According to Irving, the number of injections necessary to cause vomiting to cease varied from two to ten, given over a period of one to two weeks.

Summary

1. The vomiting of pregnancy occurs in approximately one-half the number of all pregnant women.
2. The exact etiology of this vomiting is unknown. The most recent theory is an avitaminosis.
3. The pathology is that of starvation.
4. Persistent tachycardia, fever, diacetic acid and acetone are danger signals.
5. The majority respond promptly to rest, diet, glucose therapy, fluids and vitamins.
6. Those that fail to respond to adequate treatment in a reasonable length of time should be aborted.
7. Therapeutic abortions delayed too long are not live-saving measures.
8. Deaths from hyperemesis are avoidable.
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A Review of Current Literature on Traumatic and Neurogenic Shock

By Walter Henderson, Meds '44

The term “shock” should be defined, not as a state or condition, but as a process—a process of the loss of blood volume brought about through tissue asphyxia which results from inadequate blood-flow. The statement that “the patient went into shock” is so generally and loosely used that it rarely conveys any idea as to what may have occurred. From the surgical and military points of view the term shock should be applied only to that train of symptoms resulting from reduced circulating blood volume. A good definition has been offered by Moon, as follows: “Shock is a circulatory deficiency, neither cardiac nor vasomotor in origin, characterized by decreased blood volume, decreased cardiac output and by increased concentration of the blood.”

Classification

It has been customary in the past to differentiate shock into primary and secondary types according to etiological differences. PRIMARY SHOCK is a term which may be applied to the condition brought on by psychogenic and neurogenic influences immediately upon receipt of the injury, and is synonymous with syncope or collapse. SECONDARY SHOCK is a term applied to a condition characterized by a fall in blood pressure and development of oligemia, which comes on after a varying interval after the arrival of the causative agent.

Blaclack has recently put forward a classification which is based upon physiological changes, and he makes his differentiation of the various types as follows:

1. Neurogenic Shock—this corresponds to primary shock. The chief factors causing it are those which influence the nervous system directly, such as trauma and spinal anaesthesia; reflex effects such as exploration of the peritoneal cavity; and psychic effects such as syncope.

2. Haematogenic Shock—this corresponds to secondary shock. It is characterized by reduced blood volume. Causes of this type are hemorrhage, injury of large masses of tissues, burns and other conditions in which there is rapid and severe dehydration.

3. Vasogenic Type—a vascular dilatation.

4. Cardiogenic Type—a central type of shock and of rare occurrence.

Mechanism, Nature and Dynamics of Shock

1. Psychogenic Shock—develops as a result of psychic influences
on the medullary centres and is seen in its simplest form in syncope due to prolonged psychic distress or physical pain.

(2) Neurogenic Shock—develops as a result of sensory impulses travelling along somatic or autonomic nerves to the medullary centres. Frequently this type of shock is seen in patients undergoing abdominal operations, etc. Kabat and Hedin have shown by experimentation on cats that there is a nervous factor involved in the production of shock due to burns in that the shock is greatly lessened by transection of the spinal cord. Lorber, Kabat and Welte have demonstrated that a condition of shock may be induced by injuring an extremity entirely disconnected from the body except for the nerve trunks.

(3) Traumatic Shock—As to the vascular and cellular dynamics in the process of shock, much has been written; in this article, only the basic principles will be touched upon.

The causes of traumatic shock are usually haemorrhage, injury of large masses of tissues, burns, and other conditions in which there is rapid and severe dehydration. The condition of peripheral circulatory failure arises on the basis of an increased permeability of the capillary wall to all the constituents of the plasma. So long as (1) the capillaries possess a normal reactivity and permeability, (2) the concentration of the plasma is within normal limits, (3) the electrolytic balance is maintained, and (4) cardiac compensation is intact, the blood volume remains practically constant and capillary functions are properly carried out.

The trauma alone, the causative toxic agent, or a combination of the two results in dilatation and increased permeability of the capillaries, plus upset of fluid balance plus increased cellular permeability, so that the plasma protein, in addition to other constituents of the blood, is allowed to escape into the extravascular spaces. The following result: First, there occurs a decreased blood volume; second, there is a decrease in the cardiac output; third, there develops a considerable degree of haemoconcentration; and fourth, peripheral circulatory failure follows rapidly unless the disturbed physiology is corrected.

The haemoconcentration (6,000,000 - 9,000,000 r.b.c./c.mm.), the decreased blood pressure and cardiac output, the increased blood viscosity, and the circulatory stasis in the dilated capillaries results in cell anoxia. Anoxia itself has been proven to be capable of causing dilatation and increased permeability of the capillaries. Thus, with the anoxia, still greater dilatation of the capillaries results, causing a more widespread and profuse loss of intra-vascular fluid resulting in further decrease of blood volume and more marked haemoconcentration.

Thus a “vicious circle” is set up, which will result in death unless
therapeutic measures are instituted to stabilize the unbalanced physiology.

**The Development of Shock From Trauma and Burns**

The extravascular permeation is also augmented due to the loss of plasma proteins which results in an upset of the fluid balance due to changes of osmotic pressure. Changes in tissue cell permeability also occur, causing further permeation.

The explanation of the above-described phenomena has been attempted by many workers. According to Cannon’s Theory, injured tissues release a toxic substance, histamine, into the blood stream, which causes increased capillary permeability and transudation.

The toxic theory states that in certain conditions such as pneumonia, peritonitis, etc., bacterial toxins are released into the blood, which cause loss of tone in the capillaries.

**Crile’s Theory of Nervous Stimuli**—that the discharge of nociceptive nervous stimuli is an important etiological factor in the production of secondary shock. Some now claim that traumatic shock is the result of a dysequilibrium of the vago-sympathetic system brought about by reflex excitation from the site of trauma.

Other theories have been advanced such as general vasoconstriction on the basis of stimulation of the adrenal medulla, and on the relation of anoxia of the capillaries to shock, and also on the relation
of the adrenal cortex, but, although any one or all of these may play a part, these theories have yet to be proven to the satisfaction of all.

Many well-founded objections have been raised against the toxic, the Cannon and the Crile theories, and now it is more or less generally accepted that the condition of shock arises more directly on the basis of local or local and general fluid loss brought about in a direct way by the trauma—be it haemorrhage, burns, destruction of large amounts of tissue or dehydration.

**Clinical Features**

Prostration is evident. The patient is profoundly depressed and restless. The pulse is rapid, weak and thready. The body temperature is low and the extremities cold. The face is drawn, ashen or livid in colour, anxious and covered with perspiration. The eyes are sunken, surrounded by bluish rings, producing the typical Hippocratic Facies. The patient is thirsty but vomits if given water.

**Cardio-Vascular System**—An increase of pulse-rate usually accompanies the fall in blood pressure. The fall in blood pressure indicates that secondary shock is established, and Matthews has pointed out that it is a sign of cardiac decompensation. In severe cases, the blood pressure may fall so low that it cannot be measured. The heart sounds are faint, and in severe cases there may be a gallop rhythm due to diminished blood flow through the coronaries.

**Respiratory System**—Breathing becomes shallow, with deep sighs, and this progresses until terminally the respirations become deep and sighing, with marked irregularity.

**Urinary System**—Oliguria or anuria develops.

**Nervous System**—There is apathy, stupor, delirium and unconsciousness. There may be tremors and twitchings. Later there occurs loss of sensitivity, or responsiveness to stimuli and of reflexes. Unconsciousness or coma precedes death.

**Gastro-Intestinal System**—Klemperer and Penner have stated that shock is manifested in the gastro-intestinal tract by focal erosions which may occur in any part of it and may give rise to haemorrhage. They theorize that visceral vasoconstriction leads eventually to anoxæmic tissue necrosis, resulting in the appearance of many focal lesions. Other symptoms are thirst and vomiting, and in the terminal phases there is faecal incontinence.

**The Crush Syndrome**

This is a syndrome that has only recently been described. Bywaters and Ball have reported four such cases among air raid casualties.

The features are that following severe and prolonged crushing with
pressure, the patient is admitted to a hospital with swelling of the limb, wheals on the skin and areas of local anaesthesia. The general condition may be good at first, but later deteriorates with falling blood pressure and haemoconcentration. The injured limb shows more severe changes with increased swelling, diminution or disappearance of arterial pulse, and there may be evidence of incipient gangrene. Another very important feature is oedema of the face and hands.

Signs of renal failure become evident. The urinary output diminishes. The urine contains albumin and casts. The blood urea sometimes rises to 400 mgm. per cent. The blood potassium rises to about 28 mgm. per cent, and there is an increase in blood phosphorus and the plasma chlorides fall to about 400 mgm. per cent. Vomiting and abdominal distention also occur. The patient’s mental condition is also affected: he may be very anxious, or may lie in a stupor. Occasionally he complains of a sensation of tightness in the chest.

Treatment is carried out as in secondary shock.

Differential Diagnosis

Fat Embolism—Fat embolism is found extremely frequently if looked for. In 12 to 75 per cent of the general run of autopsies fat embolism will be found, and in traumatic cases this incidence increases to 25 to 100 per cent. The source of the fat is usually from the tissues surrounding the site of the injury. Fatal cases require the liberation of 200 gm. into the blood stream. Fracture of the patella has been known to cause death from fat embolism. However, a small fracture like this cannot liberate 200 gm. of fat, but Bowers believes that only a very small part of this is liberated, and that this portion upsets the colloidal balance of the blood so that separation into fat globules occurs. Fat embolism is confused with shock because it follows injury and is accompanied by dyspnœa, restlessness, increased pulse rate and decreased arterial pressure. There are pulmonary, cerebral and cardiac forms of fat embolism.

Treatment of Shock

“The best cure for shock is prevention”—Crile.

(1) Prevention in Surgical Operations—This is very important. The psychological reactions of a patient approaching a surgical operation must be studied as these may exert an influence on the result achieved.

Attention must be given to the patient’s nutrition. The required normal water intake per day is 3,000 cc. If for any reason the patient is unable to take this quantity by mouth, supplementary administration of fluids must be carried out either rectally, subcutaneously or intra-
venously. In marked dehydration, renal function is usually impaired and glucose should be given in 5 per cent solution in distilled water. If chlorides are required, as in severe vomiting, a 5 per cent glucose-saline solution is given. If there is severe acidosis, sodium bicarbonate plus glucose-saline is essential. If plasma proteins are down, whole blood or plasma are required. If the patient is anaemic, the deficit of haemoglobin and r.b.c. should be supplied by the transfusion of whole blood before the operation. Other important factors are: conservation of body heat; avoidance of undue exposure; prevention of excessive loss of blood during the operation. If ether is used, a high percentage of oxygen is essential. After operation, the patient must be kept warm and quiet, and body fluids maintained at a normal level.

(2) Prevention of Shock in Wounds—Shock is liable to develop in wounded persons who are exposed to cold or suffering from fatigue and hunger, and these factors must be dealt with. Gentle handling is necessary, and they must be warmly wrapped. Control haemorrhage by tourniquet, splint wounded limbs, relieve pain with morphine. Give warm stimulating fluids by mouth, provided there is no abdominal injury.

Active Treatment of Shock

(1) General—Transportation of Patient: Handle as little as possible. Arrest any obvious haemorrhage by means of a tourniquet. Rest, preferably in the Trendelenburg position, to improve the circulation. Keep their surroundings quiet. Heat; the patient rapidly develops a subnormal temperature due to the loss of heat through perspiration. Keep the ward warm, cover the patient with warm clothes, warm the bed with hot water bottles and bricks wrapped in blankets. Heat administered must be carefully controlled or deleterious effects may follow.

(2) Drugs: Morphine is given if the patient is in pain, and it will tend to decrease restlessness and inhibit excessive motion, which may augment haemorrhage. It is contra-indicated in the event of a head injury, and here bromides may be given rectally or luminal I.M. Stimulants: Coramine or Caffeine frequently used. Vasospastics such as neosynephrin and veritol have been recommended by some, but their value has not been definitely established since a state of vasoconstriction is already present. Desoxycorticosterone is a preparation which has recently been reported by Wilson and Stewart to be of considerable value in the treatment of secondary shock. In cases of profound shock, it has been found that it is incapable of raising the blood pressure by itself, but is of value when used along with intravenous infusions, etc.

(3) Administration of Oxygen—This is of great importance, not only as a part of the active treatment of shock, but as a preventive measure. When a patient is suffering from peripheral circulatory
failure, the oxygen saturation of his blood is considerably lowered, the capillary endothelium suffers from anoxia, as do also the cell membranes. Thus it is important to give oxygen and to give it early, although it is not wise to continue this treatment for more than a period of 48 hours at a time. Oxygen may be given by means of nasal catheters or tubes, by the B.L.B. inhalation apparatus, or with an oxygen tent.

(4) Intravenous Infusion — The administration of glucose and saline solutions is effective as an emergency procedure. The result is only temporary for when 1,000 cc. of either of these solutions is given, within one hour the entire amount will have passed into the tissues. GUM ACACIA is a solution which has colloidal properties with molecules too large to pass through the damaged capillary wall, and it will remain in the vascular tree for 10 days to three weeks after it is given. It is entirely inert and serves its function only by mechanically increasing the blood volume. It must never be mixed with glucose solution for large clumps of calcium precipitate and may form a fatal embolus. Another disadvantage is that the colloid properties of the acacia make subsequent blood typing impossible, and therefore blood for cross-matching must be taken before intravenous administration of acacia.

(5) Blood Transfusion—Blood may be obtained in fresh or stored form. Either is satisfactory. The blood bank has a very definite place in the emergency treatment of casualties. Whole plasma or serum have been used with good results. Dried plasma has a particular advantage in that it is concentrated, and thus may be easily stored and transported, and it has been proven to work just as effectively as the liquid form when reconstituted. Plasma and whole blood are equally efficient in restoring the blood volume, whole blood being used mainly for patients in which the blood-volume is reduced mainly by hemorrhage. Immediate transfusion is necessary for patients with serious injuries and a reduced blood pressure. The rate of transfusion is rapid, and in the first thirty minutes 1,000 cc. should be given. If the blood pressure has now reached about 100 mm. of mercury, the transfusion may be continued by the intravenous drip method. In the treatment of secondary shock accompanying burns when large amounts of fluid may be lost from the body, Black found that at first one litre of plasma is required in the average case. However, two or three times this quantity may be necessary.

The aim in the treatment of shock is twofold:

(1) Adequate blood flow to vital centres must be maintained.

(2) Blood plasma volume must be brought back to normal as quickly as possible.
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DAY AND NIGHT SERVICE
OBESITY IN CHILDREN
By I. P. Bronstein, L. J. Halpern and A. W. Brown

The theme of the article is to emphasize the fallacy of the present assumption that obesity is usually an expression of some underlying endocrine dysfunction. This inaccurate opinion has resulted in an indiscriminate administration of endocrine products. The authors advocate a general treatment of overweight children, which consists mainly of a restriction in the diet and fluid intake and of the addition of ample vitamins, and they report successful results when the children adhere to the prescribed regimen.

The authors, moreover, stress the fact that, in their experience, obesity in mentally adequate children usually tends to correct itself at or about puberty for, at this time, they realize that their obesity is a handicap and are willing to co-operate in a dietary regulation.

PHYSICAL TREATMENT OF ACUTE WAR NEUROSES
By W. Sargant

A great deal of stress is laid upon immediate first aid treatment of cases who have broken down under the abnormal strains of wartime. This treatment should be applied during the first few hours and consists primarily of physical methods. For acute pains heavy sedation is prescribed so that the unconsciousness that sets in may prevent the development of a neurosis requiring hospital treatment.

Already established neuroses should be treated in hospitals by psychiatrists, using continuous sleep, modified insulin or convolution therapy. In conclusion, the author advises the following doses in first aid of neuroses: paraldehyde, two to four grains; sodium amytal, six to nine grains, or medinal, ten to twenty grains.

DETECTOR OF METAL FRAGMENTS IN WOUNDS
Dig. Treatment, p. 725, April, 1942.

By the recent invention of a cleverly devised indicator—which will soon eliminate the usage of probes and X-rays as detectors of metal fragments in wounds—pieces of metal may now be removed from traumatic injuries with great facility and speed. The designer of the instrument was Colonel John J. Moorhead of the U.S. Army, professor of traumatic surgery at the Army Post-Graduate School in New York City.

The detector consists of a radio frequency circuit mounted in a box, with a movable coil connected by a wire, which is covered with rubber so that it is detachable and may be sterilized by boiling, and enclosed in a water-tight steel finger, half an inch in diameter and twelve inches long. As the indicator approaches a concealed piece of metal, the pointer of the milliammeter deflects, one knob of the instrument adjusting for iron fragments and another for other metals.

The indicator is passed above or about the wound in two places at right angles to one another and marks are made on the flesh at the points of greatest deflection so that the projection of these points indicates the metal particle's position. If necessary, the detector may be introduced directly into the wound, even in lung, brain or abdomen.

This instrument possesses decided advantages over the X-ray method. It requires much less time to locate the fragments. The detector is cheap to construct and operate, whereas an X-ray outfit is quite expensive. The machine, moreover, is easily portable.
RELATION BETWEEN ENCEPHALOGRAM AND FLYING ABILITY
By M. THORNER, F. A. GIBBS and ERNA L. GIBBS
War Medicine, p. 255, March, 1942.
The Gibbes and Thorner compared the flying ability of 55 student flyers and 54 pilots with the electroencephalographic observations and suggested that it may be possible, by using correct criteria, to select a superior group of candidates for flying instruction so that the number of failures would be decreased and the number of successes greatly increased.

They found that flying ability can be correlated with:
1. the distribution of energy in the right occipital spectrum;
2. the dominant frequency and character of the control electroencephalogram (ink record); and
3. the amount of slowing that occurs with over-ventilation.

SOME FACTORS IN PROGNOSIS IN CARCINOMA OF THE CERVIX
By A. A. GEMMELL
The author obtained his data by treating 151 cases of carcinoma of the cervix during the years 1929 to 1937.

Histological grading, from biopsy specimens, does not determine the prognosis. The age or parity of the patient at the time of treatment is no guide to the prognosis. The variation of dosage of radium, within wide limits, has no effect on the prognosis.

The appearance of the bladder is very important in the extensive stages of the disease. Patients with transverse ridging or edema of the bladder mucosa have only half the chance of surviving as compared with patients with very little or no bladder involvement.

Approach of the growth to the rectum seriously darkens the prognosis. Digital examination, in this case, will give as much information as a sigmoidoscope.

The prognosis in stump carcinoma is the same as if the whole uterus were present.

EXPERIENCE OF THE CANADIAN ARMY AND PENSIONS BOARD WITH AMPUTATIONS OF THE LOWER EXTREMITY
By W. E. GALLIE
Four important amputations are considered — the Syme, the mid-calf, the Stokes-Gritti and the mid-thigh.

The Syme operation is the most satisfactory and does not make the patient too dependent on an artificial limb. It allows the patient to carry on normal activity in any sort of daily work. It is not a very suitable operation for women because the mechanism of the artificial limb makes a rather unshapely ankle.

The Syme's operation becomes unsatisfactory if—
1. The heel pad is not over the end of the bone;
2. The heel pad is too large and wobbly;
3. The bone ends are irregular.

These three factors must be kept in mind when deliberating the operation.

The mid-calf operation has many drawbacks. The stump can become cold, blue, very painful and ulcerated. Painful neuromata are prone to develop. Because weight is borne on an area unaccustomed to this, the patient must rest his stump for part of the day and may even complain of phantom limbs.

Many Canadian pensioners with this amputation must finally submit to the Stokes-Gritti operation. The British Ministry of Pensions report that they rarely have any trouble with the calf amputations.

The Stokes-Gritti operation is superior to the mid-thigh because its stump gives better weight-bearing and also because the skin in this region is able to withstand more pressure. The patella must be firmly anchored to the end of the femur, otherwise it will slip off.

Guillotine amputations are only used to save life and cannot bear artificial limbs.

SUMMARY
1. The Syme's operation is the most satisfactory.
2. A mid-calf operation is suitable only for those doing sedentary work.
3. The Stokes-Gritti stump can stand a great deal of hard wear and weight-bearing.
FULL THICKNESS SKIN GRAFT FOR
THE RELIEF OF BURN CONTRAC­
TURE OF THE NECK
By T. G. Blocker
St. L. Surg., p. 850, December, 1941.

Severe burns are the most common forerunners of contractures of the neck. In severe cases, where there has been much loss of skin, the chin is firmly adherent to the chest. In mild cases, there may only be a webbing of the skin and operation is done for cosmetic reasons only.

Thick split grafts are unsuitable because scar tissue forms beneath them and the grafts tend to become wrinkled and contracted. They are only used early as temporary measures when full thickness grafts are contra-indicated by a danger of infection.

Full thickness grafts are very adequate. They are superior to a tube pedicle operation because only one operation is required and because the functional and cosmetic results equal and even better those of the tube pedicle flap.

The technique is simple but must be rigidly adhered to. The scar is completely excised, allowing the structures to resume their normal relations in the neck. The graft is cut to pattern, preferably from the inguinal region since the colour of the skin there very closely matches that in the neck.

The graft is stitched into place and suturs are left long so that they can tie a pressure bandage over the area. The pressure bandage is composed of greased gauze, cotton soaked in saline, and a layer of fine grade mechanic's waste. The pressure dressing is applied for seven to ten days. After this, daily dressings of zeroform are applied.
—J. M. S.

CLOSED WOUNDS OF THE CHEST
AND THE PHYSICIAN’S PLACE
IN A CHEST TEAM
By J. A. Nixon

The author discusses conclusions he drew from experience gained in the last war. They are as follows:

1. Very few cases direct from the line are treated expectantly, although unusual circumstances, such as lack of equipment, may compel expectant treatment.

2. It is unwise to aspirate the pleural cavity for either pneumothorax or hemothorax immediately after injury. In post-operative aspiration, no fluid must be allowed to collect in the pleural cavity. In management of empyema, resection and drainage is considered only after repeated aspirations.

3. Blood pressure readings are valuable in differentiating shock from hemorrhage; the pressure drops sooner in the latter. Signs of increasing effusion, after 24 to 36 hours, are hardly ever due to active hemorrhage.
—J. M. S.
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ACUTE INJURIES OF THE HEAD: THEIR DIAGNOSIS, TREATMENT, COMPLICATIONS AND SEQUELS
By G. F. Rowbotham, B.Sc., F.R.C.S.
(with a foreword by Norman M. Ott, M.B., F.R.C.S. Ed.)
(pp. 228, illustrated, 25s, plus 7d postage. Edinburgh: E. and S. Livingstone, 1942.)

This book is written primarily for those who find themselves responsible for the early treatment of head injuries. During time of war with casualties in the field and an increased number of accidents in industry, such a monograph fills an urgent need. The author is well qualified, having personally dealt with over a thousand cases of head injury.

This book provides sound and detailed instruction in the dynamics, pathological processes, diagnosis, treatment and sequels of head injury. The surgical principles in the repair of head wounds are well presented. The author favours the institution of moderate dehydration for all but a few cases. He states that operative opening of the skull is necessary in only a small proportion of all cases. However, he describes sub-temporal decompression in detail.

There is a comprehensive and sympathetic discussion of the interplay of functional and organic factors in post-concussion disability. Mr. Rowbotham shows a wide grasp not only of the acute surgical emergencies but as well of the neurological, psychiatric and social problems raised by head injuries.

—H. Fachnie.

THE APPLICATION OF ABSORPTION SPECTRA TO THE STUDY OF VITAMINS, HORMONES, COENZYMES
By Morton

This small book, deceptively entitled "Vitamins" on the cover, emphasizes the importance of absorption spectra in chemical and biochemical research. As one would expect, the material presented is highly
complicated, both chemically and mathematically. This complexity renders the book almost useless to the ordinary medical student. Material of interest and value to the student is so wedged in between the technical material that its discovery is tedious and time consuming.

Several good qualities are shown by this book, however; qualities which authors of more widely used texts would do well to notice. Graphs, charts, and chemical formulæ in particular are reproduced in large, clear form. The absorption spectra are shown in unusually intelligible form. Thus the very technical material is rendered understandable to some degree.

This book is undoubtedly intended for the advanced worker. Although the scholars of second year may find the section on coenzymes of some value, students in general would do well to leave this text on the shelf. More important and more interesting material can be found in any physiology or biochemistry text.

—G. F. Stevenson, '46.

WAR MEDICINE: A SYMPOSIUM

Editors: Winfield Scott Pugh, M.D., Edward Podolsky, M.D., and Dagobert Runes, Ph.D.


From the vast volume of current literature dealing with war medicine, the editors of this book have compiled articles by fifty-two authors, including Surgeon Rear Admiral Gordon-Taylor, Fulton of Yale, and Winnett-Orr. The extensive subject matter is classified under the headings of surgery, aviation medicine, naval medicine and general medicine.

Wakeley’s chapter on “The Treatment of War Burns” is particularly up-to-date, interesting and well illustrated. Kendrick and Neuhauser, writing on “Blood Substitutes in the Military Service”, trace the development of the utilization of blood plasma and the present method of dispensation used in the United States Army and Navy. They also review briefly the recent advances, and the experimental results of new agents in this field. The extremely important part that the plasma protein plays in the physiological processes of the body is clearly outlined in Marsh’s article, entitled “The Plasma Protein, Its Physiology Relative to the Normal and Failing Circulation”. Other chapters well worth special attention are Baruch’s on “Principles of Aviation Medicine”, and Hulett’s on “Malingering”.

The wide range of subjects covered in this publication is clearly evidenced in the few chapter titles mentioned. In the surgery section there is a tendency for the American authors to discuss only their
experiences in World War I. In many places much space is devoted to reiterating facts and details already covered in previous articles. By reading this book, however, one becomes acquainted with much essential information about relatively new and important branches of modern medicine.

—K. Eric Rogers, ’45.

UROLOGY IN WAR

By Chas. Y. Bidgood, Lt. Comdr., U.S.N.R.

(Baltimore: Williams and Wilkins, 1942)

In seventy-five pages, hardly more than a monograph, Lt. Comdr. Bidgood has attempted to outline the principles of the treatment of genito-urinary cases for those with little or no special training in this field. The author has not confined himself to traumatic injuries but presents a brief outline of all those lesions of the genito-urinary tract which are apt to be encountered by the average non-specialized medical officer in the field. His descriptions of some of the commoner operative procedures are particularly good because of their brevity and clarity. There is a comprehensive chapter on anaesthesia in such procedures by R. M. Towell, which seems to indicate still further that this is a book for beginners. The author has obviously had to exclude much detail and theory in the interests of brevity, but the pocket size and five-minute chapters of this book make it a worth-while bird’s-eye view of urology, and as an introduction to the subject it is ideal for the medical student.

—Douglas Lake, ’44.

THE EARLY TREATMENT OF WAR WOUNDS

By William Anderson, M.D., Etc.

(Oxford University Press, London: Humphrey Milford, 1942)

The most surprising observation that one makes on reading this little book is that a man whose name is tailed by an impressive list of degrees and hospital appointments can treat such a bewildering problem with the simplest and most definite language.

This work should have a peculiar interest for the third year men. The author describes in less than a hundred pages the types of treatment that are administered in the R.A.P., the A.D.S., the M.D.S., and the C.C.S.—terms with which we have become familiar through recent C.O.T.C. lectures. The description of the work done in the three advanced stations leaves one with rather an unsatisfactory impression of the sort of professional experience which the army has in store for us. The duties of a regimental medical officer during a battle amount to the application of first aid principles and very little else.
Work at the casualty clearing station appears to be more satisfactory. In this chapter also are described the organization and sites of the C.C.S., the mobile surgical teams, blood transfusion, and operating theatres. The remaining chapters are devoted to the various types of wounds which one sees in a forward area and the manner of handling such wounds.

I think that this book would rate as a "must" for those graduates who are on the point of becoming involved in this work. And for us in our undergraduate years, I can suggest no more profitable way of passing an evening, or part of an evening, than by giving it some attention. Two hours will be enough for a slow reader to obtain a good over-all picture of the kind of medical and surgical work that is being done "up front".

—JOHN M. KELLY, '46.

THE TREATMENT OF SHOCK

By R. W. RAVEN, F.R.C.S. (Major, R.A.M.C.)

(Oxford University Press, London: Humphrey Milford, 1942)

This brief treatise, one of the Oxford War Manuals, represents the accretion of experience in the treatment of shock through the Battle of Britain up to April 1942. The subject material pertains chiefly to the clinical picture, pathology and treatment of secondary shock with reference to the "Crush Syndrome". The latter is a rapidly onsetting, secondary shock, following severe and prolonged "crushing with pressure" of a limb. Special considerations, such as anaesthesia and the performance of surgical operations in the presence of shock, are dealt with in the concluding chapters.

The author makes no attempt to involve himself in controversy over theories, but after an introduction concerning the problems connected with definition and classification, presents his material in a concise and elucidative manner. It is not proposed to summarize the contents of the book herewith; suffice it to say that the chief aims which the author promulgates in the treatment of secondary shock are the following: (1) Replacement of circulating fluid volume by (a) whole blood, or (b) plasma, depending on the situation. (2) Prevention of further loss of circulating fluid by (a) administration of oxygen (correction of anoxia) and (b) injection of adrenal cortical extract to prevent increased permeability of capillaries.

If your curiosity is aroused, look up this compendium of 87 pages. It may be conveniently read in an evening. It should help materially in straightening out one's ideas on this debatable and highly important subject.

—T. HANSON ROSS, '45.
BOOK REVIEWS

AMPUTATIONS AND ARTIFICIAL LIMBS
By R. D. LANGDALE-KELHAM and GEORGE PERKINS
(Oxford University Press, London: Humphrey Milford, 1942)

This little book is one of the popular Oxford War Manuals patterned after those published by the Oxford University Press in the last Great War. This book deals in a concise and orderly manner with the practical applications of amputations, and the latest and most successful developments in the field of artificial limbs and their fitting. Very pertinent sections are those on the sites of election for amputations, with special attention to operative technique and post-operative treatment, as related to the formation of good stumps, suitable for the fitting of artificial limbs. A careful discussion, illustrated with diagrams, of the types of artificial limbs, is another feature of this small and easily read volume.

It is strongly recommended that medical students and practitioners should read this and other Oxford War Manuals as a means of keeping up with the rapid developments in medicine brought on by the war.

—JOHN M. HOWES, '45.

PSYCHOLOGICAL EFFECTS OF WAR ON CITIZEN AND SOLDIER
By R. D. GILLESPIE, M.D.
(New York: W. W. Norton & Company, Inc., 1942)

To those who are not sufficiently familiar with the terms and theories of modern psychology to feel quite at home where such strange growths flourish, this book will present fewer difficulties than most of its kind. The present reviewer, having chopped his way bravely through the first eight pages, found himself at once in the open. He ran into another thicket at the beginning of the second chapter, but soon struggled free and, though such barriers recurrent here and there throughout the book, he found them less numerous and less difficult than he at first expected. To those who have travelled on similar roads before they will offer no obstruction.

It is almost needless to say that the book is of practical and immediate interest, especially to those who are now engaged, or soon will be, in the medical work of the services. It is based on extensive but well-digested experience, and has been received with general acclaim.

The first chapter is historical. The author discusses changes in theory, changes in the form of psychoneurotic reactions, and historical changes in the apparent content. “The pattern of war neuroses is greatly influenced by doctors”, he writes, “and it is in war that the effect of medical suggestion in actually producing psychoneurotic reactions, at any rate in their chronic if not in their earlier stages, is most readily seen”. “Shell shock” is the most familiar example. During World War I
“the term became universally known, and the implications were deduced by those who had reason to develop symptoms so that tremors and gross hysterical paralysis and the like became in some quarters almost fashionable”. For this reason it was recommended that the term be dropped, and similarly the author believes that the expression “effort syndrome”, as a substitute for “disordered heart action”, is, if anything, worse, “since it is more obviously suggestive to even the most uninhibited mind”. Observing that psychogenic lameness, blindness, etc., are pretty much things of the past, Dr. Gillespie adds: “It is only in time of war, with its consequent revival of primitive thinking, as shown in the recent revival of interest in astrology and other types of magic, that such gross disabilities become more common”.

The second chapter is a consideration of constitutional factors in psychoneuroses, and an interesting distinction is drawn between “symptoms psychologically produced, symptoms psychologically precipitated and symptoms psychologically sustained and continued”. The third chapter is a study of social factors in psychoneuroses, including family life, economic status, educational status, occupation, unemployment, competitiveness, social insecurity, isolation and fatigue. The author then proceeds, in chapter 4, to psychoneuroses among civilians in war, (a) following exposure to danger, and (b) following disorganization of the life of the individual as a result either of conditions in a bombed area or of evacuation to a strange district. Adults and children are considered separately, and case histories, the cherries in the cake of any psychological text, are liberally provided. Psychoneuroses in the fighting forces (chapter 5) are considered under three main headings: “the constitutional predisposition; environmental stress; and the inner psychological factors, of which the wish to escape is usually the preponderant, although by no means the only one”. Chapter 6 is a brief but illuminating essay on morale—individual and national—and the seventh and final chapter is a philosophical discussion of human relationships in the post-war world.

The book is hereby recommended as a very readable and undoubtedly a very useful work. An expert opinion of its merits (by Dr. H. A. Steckel of the Syracuse Psychopathic Hospital) will be found in the September issue of the American Journal of Psychiatry.

—LLOYD G. STEVENSON, ’45.

THE DOCTORS MAYO
By H. B. CLAPESATTLE
(Minneapolis: University of Minnesota Press)

The past few years have brought forth a number of books about doctors. Of these, “The Doctors Mayo” stands out as one of the best. The result of five years’ work on the part of its author, the book deals
with the life of Dr. W. W. Mayo, and with the lives of his famous sons, Dr. Will and Dr. Charlie. It is, however, much more than a biography of three great men. It is the story of how the practice of a horse and buggy doctor on the Minnesota frontier developed into a medical institution of international fame.

The early chapters of the book, which deal with the life of the old doctor and are an account of how medicine was practiced in the days when the West was young, are especially interesting. The latter two-thirds of the book deal with the development of the Clinic, and the lives of the Mayo brothers, whose story is the story of modern medicine.

Highly entertaining, this book is to be especially recommended to the medical student, particularly if in addition to being desirous of some good reading, he feels the need of a little inspiration.

—R. M. Boughton, B.A., '44.

RECENT ADVANCES IN OBSTETRICS AND GYNAECOLOGY

By A. W. Bourne and L. H. Williams


The fact that there has been only a three-year interval since the last edition of this work was published shows that even in wartime there has been a distinct advance in obstetrics and gynaecology.

The chapter on carcinoma and its treatment by radiotherapy gives valuable statistics with regard to various methods of treatment, and the special applicators that are recommended by various schools of radiotherapeutics are well illustrated. Leucorrhea is very well discussed, and the latest work, physiological, pathological and therapeutic, has been included. The authors seem to be optimistic in their statement that the discharge caused by monilia is easily cured by a few applications of aniline gentian-violet. One of the best chapters is on puerperal sepsis, which is well up-to-date both as regards the aetiology and the chemotherapy. All the new work on sex hormones has been considered, and the treatise by Dr. Justina Wilson on physiotherapy in gynaecology indicates that this treatment often produces excellent results in pelvic inflammatory conditions.

As the title indicates, the book chronicles “recent advances” in the fields of obstetrics and gynaecology, but the ideal aimed at has been to record only that new work which has been tested sufficiently to establish it as having real practical and permanent value.

—Marion G. Webster, '44.
MENTAL HEALTH IN COLLEGE

By Clements C. Fry, M.D., with the collaboration of Edna G. Rostow

(New York: The Commonwealth Fund, 1942)

“All students”, writes Dr. Fry, “and especially undergraduates, are engaged in an effort to achieve, or to resist, the responsibility of maturity.” In the effort to achieve maturity the students of Yale are surely fortunate in having available to their need the advice of a staff of psychiatrists and clinical psychologists appointed for the purpose. (The details of the arrangement are explained in the preface.) The book is “a descriptive analysis of the problems presented by Yale students to the Division of College Psychiatry and Mental Hygiene of the Department of University Health during a ten-year period between 1926, when the Division was established, and 1942”, and is presented very largely in the form of case histories. Part One is introductory (a general discussion of the problem and the materials of study); Part Two concerns the problems of personality growth (family relationships and sexual growth, behaviour and attitudes); Part Three the reactions to undergraduate environment (scholastic and social adjustments); and Part Four such special problems as the more serious disorders of student mentality. The study embraces the graduate and professional schools of Yale as well as the ordinary undergraduate schools.

It is strange to discover that the one common factor among the medical students was their resistance to psychiatry. “There is one sense in which the medical school histories do stand out rather sharply from others—in the attitudes of the patients toward psychiatric treatment. It is strikingly true of the patients from medical school that they were not interested in seeking a general readjustment of their personalities through psychotherapy.” Are we to assume that they had received adequate information and needed nothing further? (If so, why did they consult psychologists?) Or had their special training reinforced (rather than abolished, as it should have done) a general prejudice? Perhaps it all depends on how psychiatry is taught. Are Yale medical students similarly loth to undergo surgery or swallow beneficent drugs?

It seems to the reviewer that the chief importance of the book lies in its demonstration of the value of a mental hygiene service for college students, rather than in the elucidation of anything strikingly new in the psychology of the young human animal. Anyway, it makes good reading.

—Lloyd G. Stevenson, '45.
TREATMENT OF BURNS

By Henry N. Harkins, M.S., M.D., Ph.D., F.A.C.S.

(Springfield and Baltimore: Charles C. Thomas, 1942)

The author points out that, although in normal times there are 6,000 deaths annually from burns in the United States, only two books have been published on all aspects of the burn problem. One was a German work published in 1879, and the other was written by Pack and Davis in 1930.

This comprehensive work on burn therapy concerns itself with pathology, chemistry, and blood concentration. It deals with primary and secondary shock, the rôle of the adrenals, of fluid loss, of toxins, and of bacteria in burns. There is discussion of early and late complications in burns, of general and local treatment, of the new discoveries, and of recent international developments. Burns disfigure: hence early and late plastic treatments are considered. Special burns, regional burns, electrical and radiation burns, chemical burns, and freezing, as well as war burns and industrial burns are all included in this text.

Today a book of this character is timely and needed.

—Marion G. Webster, ’44.

A TECHNICAL MANUAL ON CITRATED HUMAN BLOOD PLASMA

United States Office of Civilian Defence, Washington, D. C.

This manual was prepared for the Medical Division of the United States Office of Civilian Defence under the direction of the Subcommittee on Blood Substitutes of the National Research Council. The introduction considers indications and contra-indications for the use of blood plasma and whole blood, and following this there is a discussion of certain essential minimum requirements which must be observed without variation in the preparation of normal human blood plasma. The third section of the manual discusses the operation of a plasma processing laboratory, and gives a detailed description of the apparatus and technique which is actually being used in active hospital laboratories, a technique which is fulfilling its function with a minimum of effort and waste. Two examples of the many possible procedures are detailed. One of the chosen examples happens to process to the frozen state, since that most nearly meets its requirements; the other processes “dilute” plasma from preserved blood for the same reason. The descriptions are concise, and yet cover the methods of procedure thoroughly, considering all angles from the preparation of the donor to the final labelling of the plasma. The fourth section is composed of a brief review of the use and dosage of citrated plasma in those clinical conditions most commonly occurring in civil and military emergencies. The appendix
contains details of the chemical procedures and tests to which references were made throughout the manual. There is also a partial list of references to serve as sources of additional information on the preparation and use of human plasma.

—FRIEL STEWART, ’45.

SEROLOGY IN SYPHILIS CONTROL
By REUBEN L. KAHN, M.S., D.Sc.
(Baltimore: The Williams & Wilkins Co., 1942)

This concise text is one that the practising physician has long needed. The book was written for the purpose of aiding the physician in diagnosis, treatment and control of syphilis, and is not encumbered with valueless detail. The author does not try to decide which serological test is better or worse than another, nor does he give lengthy descriptions of technique, but he deals with the principles of practical serology, the considerations that will best enable the practitioner to utilize these tests profitably. A clear, concise chapter is devoted to “sensitivity” and “specificity”, in which their meaning and importance in syphilis are adequately considered. Each chapter is supplemented by a summary, in which, with a very minimum of words, the salient features of the chapter are strongly emphasized. These summaries are especially useful after a preliminary reading of the full text.

—ARTHUR H. SUSSMAN, ’45.

PHYSICAL SIGNS IN CLINICAL SURGERY
By HAMILTON BAILEY
(8th edition. Bristol: John Wright & Sons Ltd., 1942)

The eighth edition of Physical Signs in Clinical Surgery is in many respects a new book. The majority of the plates for illustrations previously used were destroyed by enemy action and have been replaced by new ones, incorporating new ideas. This new edition contains 455 excellent illustrations, a number of which are in colour. It is written in a simple, straightforward manner, which permits of truly easy reading, and contains a wealth of knowledge in a limited amount of space. I am sure that everyone who has read the book will recommend it highly. This is a standard, time-tested volume, much improved by recent additions, and every student and practitioner of medicine would do well to possess a copy.

—WARD VAN PATER, ’45.