

CHAPTER III.

INJURIES OF THE ŒSOPHAGUS.

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TRAUMA FROM AN INTERNAL SOURCE.

AMONG injuries of the œsophagus produced by violence from within are: injuries resulting from foreign bodies that have been swallowed or have entered the œsophagus in some other way; also injuries caused by bougies, coin-catchers, and other instruments. The latter form of injury is particularly liable to occur if there are pathological changes of the œsophagus, such as carcinoma, ulcer, stricture, etc. The instrument may penetrate or perforate the wall of the œsophagus, or even enter the pleural cavity or mediastinum, setting up fatal mediastinitis or pleuritis. These injuries will be discussed when treating of foreign bodies, phlegmonous œsophagitis, perforation and stricture of the œsophagus.

Burns of the œsophagus and injuries produced by caustics will be considered when discussing corrosive œsophagitis.

EXTERNAL INJURIES OF THE ŒSOPHAGUS.

Owing to the deep situation of this organ, injuries of the œsophagus through violence from without (stab-, incised, and gunshot-wounds) are extremely rare. This discussion belongs more properly to the chapters on injuries of the neck and thorax for the reason that their prognosis depends upon the coexisting injury of the neighboring organs, and for this reason only the more important features will be mentioned here.

In the neck the most important injuries are those of the large vessels and nerve-trunks and the respiratory passages, and in the thorax those of the pleura, the lungs, heart, etc. In injuries of the neck it is hardly practicable to carry out a distinction between the pharynx and the œsophagus.

According to Wolzendorf, the mortality of gunshot-wounds is twice that of incised wounds (44.2:22.5 per cent.); gunshot-wounds are more frequently followed by strictures (7.7:3.8 per cent.), but fistula occurs less frequently than in incised wounds (3.8:18.8 per cent.). The mortality of stab-wounds of the cervical portion of the œsophagus is the same as that of gunshot-wounds.

Wounds and Injuries of the Cervical Portion of the Œsophagus.—In the anterior portion of the neck stab- and gunshot-wounds are generally more dangerous than the incised wounds commonly pro-

duced in attempts at suicide, owing to the fact that vessels and nerves are more frequently injured in the former, particularly in gunshot-wounds; death frequently takes place rapidly as a result of the latter or through injuries of the spinal cord; on the other hand, there are cases in which a bullet has passed between the trachea and the œsophagus, subsequently causing erosion of the œsophagus; there are cases, moreover, in which a projectile travelled transversely through the neck and, glancing from the vertebræ, was swallowed, its escape through the bowels being the first sign of a perforation of the œsophagus. A few cases of isolated gunshot injuries of the trachea and œsophagus are mentioned in literature; the majority of them recovered. In stab-wounds either both passages or only one of them is injured.

In Wolzendorf's 7 cases (with 3 deaths) the stab-wound was either directly from before backward or from one side to the other. In the first group the trachea and œsophagus were more frequently injured, but this may occur also in cases of the second group. The symptoms, course, and treatment will then be the same as those of incised wounds. Even in an unskillfully performed tracheotomy, if the posterior wall be divided, as is particularly liable in the small trachea of a child, a stab- or incised wound of the œsophagus is liable to ensue. Such cases have been described in literature. The author himself witnessed the post-mortem examination of such a case.

In injuries of the cervical portion of the œsophagus there is less danger of mediastinitis than in injuries of the thorax. The former is particularly liable to occur in injuries of the neck where the posterior wall of the œsophagus is traversed by stab-wounds. The reason for this is, that in the neck the escape of œsophageal contents takes place more rapidly, and because, in the second place, where they cannot escape freely enough and inflammatory and phlegmonous manifestations occur in the surrounding tissues, as is usually the case, it is possible by sufficiently enlarging the wound of the œsophagus, or in appropriate cases to suture the latter, and to pack the external wound with iodoform gauze and properly drain it. In other words, it is possible to produce the same conditions as are present after external œsophagotomy. Naturally, if retro-œsophageal abscess or mediastinitis should occur after such injuries of the œsophagus, they should be treated in the same way as in case of perforation by foreign bodies.

Rasumowsky recently reported a case of recovery from gunshot-wound of the œsophagus in the neck in which an ichorous abscess, situated in the posterior mediastinum in front of the vertebral column, was evacuated by means of an œsophagotomy incision.

Of the injuries occurring in civil life, transverse incisions of the neck are especially interesting on account of the fact that frequently the alimentary and respiratory passages are injured at the same time. They usually occur as a result of attempted suicide, rarely as a result of attempted homicide. In the majority of these cases the penetrating instrument had entered between the larynx and the hyoid bone, or through the larynx itself, less frequently through the trachea, and very

rarely above the hyoid bone. (Hoffmann.) In most cases therefore the surgeon has to deal with injuries of the pharynx rather than with those of the œsophagus itself. At this level the large vascular and nerve-trunks are situated at the side of the larynx, and are well protected by the sternomastoid muscle, the latter being usually in a state of contraction. Incisions between the hyoid bone and the thyroid cartilage involve these important structures less frequently therefore than incisions lower down. For this reason isolated injuries of the respiratory and alimentary passages are more frequent in the former cases.

The most important immediate and ultimate results of the injuries will be discussed among incised wounds of the respiratory passages. As far as the symptoms are concerned, it should be noted that as a rule the pharynx is penetrated, and that consequently, as is true of all wounds of the alimentary passages in the neck, there may be pain on swallowing and escape of food through the wound; that on attempting to swallow, food and fluids may enter the respiratory passages and cause violent attacks of coughing and choking. To the left of the trachea the œsophagus is sometimes only partially cut; under such circumstances the mucous membrane is visible; or if only the muscular coat has been injured, the former bulges outward. If the trachea has been divided transversely, it is displaced downward; the greatest amount of gaping being produced if at the same time the œsophagus is completely divided, in which case the inferior margins of both canals may disappear behind the inferior margin of the wound.

It has been observed a number of times that where the head was strongly bent forward toward the chest, in case of small wounds of the œsophagus, hardly any food escaped on swallowing. If several days have elapsed since injury, there is frequently found a swelling of the neck, which greatly interferes with respiration, and a foul discharge; frequently also the patients complain of unquenchable thirst.

Prognosis.—The prognosis of these injuries is by no means so serious as was formerly believed.

Treatment.—The treatment requires, in the first place, that the danger of asphyxia and hemorrhage be removed. Occasionally the symptoms are so alarming that tracheotomy must rapidly be performed at a lower level. If there is danger of secondary hemorrhage, a tampon-canula should be inserted.

At present attempts are usually made to suture the wounds carefully under antiseptic precautions, provided the condition of the patient renders this possible. In regard to wounds of the œsophagus as they occur in injury of the neck lower down, suturing is to be recommended in all cases in which the tissues are not too much contused and wherever primary union may be expected. The best method of suturing is that employed in suturing the intestines, first the mucous membrane, and then over this the muscular coat. Where the œsophagus has been completely divided and the ends have separated, the latter may be

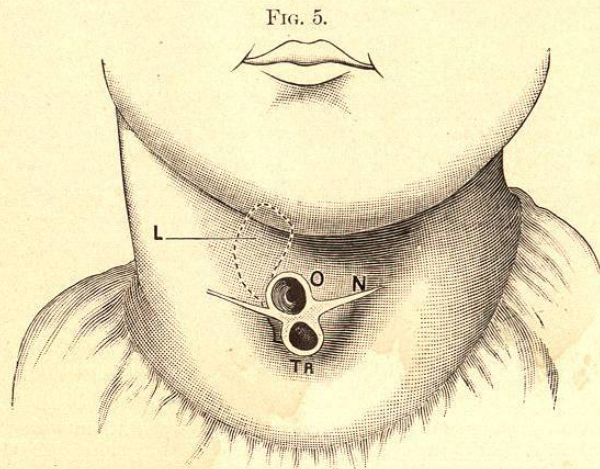
carefully separated from the surrounding tissues; occasionally this will be the only way of bringing the edges together. In extensive division of the œsophagus union is all the more important, as in these cases a fistula is liable to result.

In certain cases in which both canals have been completely divided they should be sutured. In these cases prophylactic tracheotomy as well as iodoform gauze drainage is of the greatest importance. The latter should be placed at the deepest part of the wound, and led out through the external wound, the remaining portions of which should be sutured. Even if primary union of the entire wound of the œsophagus does not occur, the suture will considerably shorten the time of recovery. Formerly, attempts at closing the tracheal wound were not made till after the wound of the œsophagus had healed, and in order to prevent the upper and lower ends of the trachea from being displaced, a T-canula was inserted. During the first days the patient should be fed by the rectum, later by carefully passing a soft stomach-tube through the mouth.

Fistula after Injury of the Respiratory and Alimentary Passages.—Functional recovery from such injuries may be rendered incomplete by the occurrence of a stricture or a fistula. Stricture of the œsophagus, however, has never been observed, not even in those cases in which the latter was completely cut across. Surgeons are indebted to Schüller for a careful investigation of those injuries, and he explains this phenomenon by the fact that repair takes place as a result of the formation of granulation-tissue, which is covered with mucous membrane from the margins of the wound, and not by the formation of a scar. At times, but not very often, a fistula of the œsophagus occurs after injury of both canals. The fistula varies according to the situation of the injury. After incision between the hyoid bone and the thyroid cartilage a fistula occurs, through which the air-passages and alimentary passages communicate with the outside; this is properly a laryngopharyngeal fistula. Where both canals are divided by an incision lower down, a true tracheo-œsophageal fistula is produced; in the latter there are two fistulous openings (as in Figs. 5 and 6). In cases in which a fistula is of greater size, and a great deal of food and saliva escape, nutrition may be impaired. The skin surrounding the fistula may suffer from eczema. Many patients suffering with tracheo-œsophageal fistula are obliged to wear permanently a tracheal canula, as on account of the constriction or obstruction of the superior portions of the larynx they are unable to breathe if the fistula becomes closed, and because if the canula is not left in place the fistula would become smaller as a result of cicatricial contraction. Frequently also they are obliged to take nourishment through a stomach-tube. There is often danger also of particles of food entering the air-passages and setting up bronchitis and pneumonia.

Wounds and Injuries of the Thoracic Portion of the Œsophagus.—In the thorax the œsophagus alone is rarely injured. This may result from injuries with daggers, bayonets, or bullets. Collateral

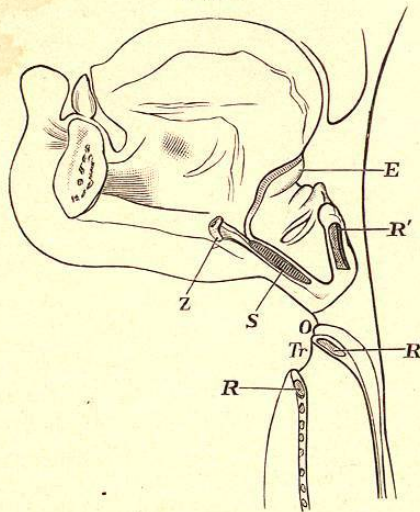
injuries (heart, lungs, pleura, etc.), which are frequently fatal in themselves on account of their anatomical position, are rarely absent.



Tr, fistula of trachea; O, fistula of œsophagus, the latter opening above the transverse scar (N) of the incision, which completely divided the trachea and the anterior wall of the œsophagus; L, skin-flap subsequently transplanted over the opening of the fistula O. (After Schuller.)

The danger of injury of the œsophagus is in itself very great, as on account of the escape of food and saliva into the surrounding tissues

FIG. 6.



O, fistula of œsophagus; Tr, fistula of trachea; R, R', R'', rings of trachea; S, thyroid cartilage; E, epiglottis; Z, hyoid bone.

or into the pleural cavity, where the latter has been opened, progressive ichorous abscesses, mediastinitis, and pleuritis develop. But even

complicated cases may recover. Thus in Wolzendorf's 6 cases of stab-wound of the œsophagus in the thorax complicated by injury of the lung recovery took place in 2.

Symptoms.—One of the most important symptoms is the escape of food through the wound. This symptom may, however, be absent in the beginning or remain absent entirely. The latter is the case particularly in narrow, slit-like stab-wounds. In injury of the lungs there may be attacks of coughing, with bloody expectoration, great anxiety, labored respiration, rapid pulse; eventually air or blood-stained froth issues from the wound or emphysema of the surrounding tissues develops. The patient can lie only on the wounded side; the latter is the seat of violent pain, which becomes tearing in character if substances that are swallowed come in contact with the site of injury. Associated with the above symptoms are great weakness and dyspnoea, followed as a rule by signs of pleuritis and pericarditis, as well as fever. Burning thirst and sighing are considered characteristic also.

Treatment.—The treatment of these injuries is hopeless. So far it has been limited to feeding the patient by the rectum or by means of a stomach-tube passed downward from above the site of injury. The remaining treatment is symptomatic, and only in the event of complications setting in is an operation performed, such as paracentesis of the thorax or thoracotomy if exudation into the pleura has occurred. For the purpose of feeding the patient, providing the condition of the latter permits, gastrostomy is the best method. By means of œsophagoscopy carefully performed it might be possible in a case of partial lateral injury of the œsophagus, to apply an iodoform gauze tampon attached to a string, and allow it to remain in place for a time. Where there are evidences of mediastinal abscess, cervical or dorsal, incision of the mediastinum must be considered. Whenever there is exudation into the pleural cavity, extensive incision of the pleura should be performed.

RUPTURE AND PERFORATION OF THE ŒSOPHAGUS

Rupture.—Rupture of the œsophagus has been observed to occur spontaneously or without apparent cause in rare cases. The majority of these were males and alcoholics. The accident occurred suddenly, as a rule after a hearty meal, usually after vomiting or violent concussion of the body (jumping from a wagon, Mosley). The laceration, involving all coats, is always found close above the cardia, and generally extends into the posterior mediastinum and at the same time into one or both pleural cavities, allowing the contents of the stomach to enter the latter. Laceration is usually longitudinal. Only in the first case described by Boerhave was it circular.

Weeny recently collected 17 authentic cases of rupture of the apparently healthy œsophagus. As Zenker and Ziemssen have pointed out, this is probably due to œsophagomalacia of the lower portion of the œsophagus, caused by autodigestion occurring during life as a result of some peculiar circumstances, so that the exciting force,

whether or not this be contraction of the œsophagus itself, produces torsion of the latter, this organ having, however, previously suffered some alteration which has diminished its power of resistance. At the same time the idea is not impossible that as a result of severe mechanical violence (crushing between car-buffers, striking against the back and the pit of the stomach, Raimondi's case) rupture of a perfectly normal œsophagus may be produced in the same way that rupture of the intestines is produced by such causes.

The accident was as a rule preceded by retching or vomiting, following which the patient suddenly perceived extremely violent pain and a sensation of something having been torn. This was immediately followed as a rule by severe collapse, without further vomiting, and, what was a particularly important sign, by emphysema of the subcutaneous tissues, proceeding from the subclavicular region and rapidly extending over the entire body. This is caused by the entrance of air and gas into the mediastinum. As a rule death occurred within twenty-four hours, preceded by marked dyspnoea and increasing anxiety, the patient continuing in a state of collapse with suppression of urine.

Treatment.—The only treatment besides narcotics would be immediate opening of the posterior mediastinum. In most cases, however, any attempts at operation will be impossible owing to the state of collapse, and because on account of the possibility of perforation of other organs the diagnosis will be uncertain.

Perforations.—Besides resulting from internal and external violence, perforations of the œsophagus may occur in many diseases of the œsophagus itself or of the neighboring organs. The principal diseases of the wall of the œsophagus are various ulcerative processes, particularly those occurring after injuries from within, after injuries from caustics, in case of stricture, and particularly in carcinoma. But other processes (as peptic ulcer) must be borne in mind. According to its location, perforation may take place into the surrounding cellular tissue, mediastinum, or into the trachea, the bronchi, or the lungs themselves, into the pleura, the pericardium, or the neighboring great vessels.

In case of carcinoma situated in the region of the bifurcation of the trachea, perforation into the bronchus, with subsequent fetid bronchitis, pneumonia, and gangrene of the lungs, frequently occurs. Pathological processes of the neighboring organs may cause perforation of the œsophagus from without. In this connection may be mentioned various neoplasms, particularly carcinoma of the thyroid gland, of the trachea, the bronchi and lungs, also descending abscesses of the vertebræ, peri-œsophageal abscess, suppuration or softening of lymph-glands, particularly the bronchial glands, suppuration of the thyroid, gangrene of the lungs, empyema, rupture of aneurisms of the aorta, etc.

In rare cases such perforations occur suddenly; the symptoms under such circumstances will be similar to those of rupture. As a rule per-

foration and communication with the neighboring organs take place slowly, and the characteristic manifestations appear gradually because the pathological processes causing the perforation have previously led to inflammatory, indurated, or carcinomatous infiltration of the surrounding connective tissue. For this reason progressive subcutaneous emphysema, which is such an important sign of rupture, is absent; in fact, under favorable circumstances perforations become closed by cicatrization. More frequently, however, ulceration slowly advances, and may lead to the formation of cavities traversing the mediastinum in various directions, and which may occupy the entire extent of the latter. From these cavities suppuration may affect the important neighboring thoracic organs, with or without perforation of the latter.

Treatment.—The principal object of treatment is to prevent the escape of food through the opening in the œsophagus by the manner of feeding (stomach-tube, by the rectum, through gastric fistula), and to institute operative interference in case of mediastinal abscess, pyopneumothorax, and pyopneumopericardium. The author will refer here to the treatment of peri-œsophageal and mediastinal abscess, and to the case of perforation of the thoracic portion of the œsophagus by a bougie which recovered after he performed incision of the mediastinum.

ŒSOPHAGEAL HEMORRHAGE.

Hemorrhage from the large vascular trunks, such as the subclavian, pulmonary artery, superior vena cava, and particularly the descending aorta, is almost always rapidly fatal whether caused by proliferation and ulceration of carcinoma of the œsophagus or some other ulcerative process, through foreign bodies, pressure of a stomach-tube (Kermanner), or whether conversely an aneurism or similar process ruptures into the œsophagus. If, as a result of the above causes, hemorrhage from smaller vessels occurs, the danger is correspondingly less serious. Perforations caused by foreign bodies are the most frequent. Besides the above-mentioned vessels, the carotid, the thyroid arteries, the inferior thyroid veins, and the vena azygos must be mentioned as sources of hemorrhage. Finally, severe and even fatal hemorrhage is caused by varices. The latter are observed particularly in the lowest portion of the œsophagus, in disturbances of the portal circulation, particularly in the various diseases of the liver (cirrhosis, etc.). Hemorrhage results either from rupture of a varix, injury of the latter by a foreign body, or erosion of the varix in the course of ulceration of the overlying mucous membrane.

Treatment.—Treatment is available only in those cases in which it is possible to locate the injured vessel and ligate it. (See Foreign Bodies.) Hemorrhage from varices usually ceases of itself. In severe cases of hemorrhage from this source treatment would as a rule be instituted too late even if it were possible to diagnosticate the site of the lesion in the œsophagus as opposed to gastric hemorrhage. It is doubtful whether, even in case of a positive diagnosis, the insertion and

inflation of a tampon on a bougie in the manner of a colpeurynter could be carried out. Schneider has considered the possibility of passing his dilating sound for this purpose.

FOREIGN BODIES IN THE ŒSOPHAGUS.

Etiology.—As a rule foreign bodies enter the alimentary passages through the mouth, as in the case of needles held between the teeth. Occasionally portions of food hastily swallowed remain impacted (unchewed pieces of meat, pieces of potato, etc.). More frequently foreign bodies are contained in the food, and thus swallowed, such as pieces of bone, fish-bones, fruit-stones, pieces of glass and enamel. Children in playing are in the habit of placing a great variety of articles into their mouths (stones, coins, keys, glass beads, bones, chestnuts, etc.), occasionally swallowing them. In adults (62 per cent. of the cases, according to Egloff) surgeons have to deal largely with poorly fitted artificial teeth that have not been removed at night, or with bones. Artificial teeth may also be swallowed during attacks of syncope or convulsions (epilepsy) or during anæsthesia if the mouth was not previously examined. Occasionally a foreign body which from its size and character ought to have readily gone down, becomes lodged as a result of some pathological change of the œsophagus (stricture, constriction through compression from without, spastic or paralytic conditions, knuckling, etc.).

The surgeon sees under pathological conditions foreign bodies most frequently impacted in cases of carcinomatous and cicatricial stricture; under such circumstances there is sudden inability to swallow fluids. As these patients generally eat carefully, the surgeon rarely has to deal with large hard foreign bodies in such cases, but more frequently with bits of unchewed meat or smaller hard bodies, such as fruit-stones (plums, cherries); in children, buttons, peas, marbles, etc.

From what has been said, it can readily be understood what a great variety of foreign bodies may enter into consideration. According to Adelman's classification, they may be divided into bodies with rough, pointed, lacerating surface, which produce injury, and into bodies with a smooth surface, soft and hard, which principally produce obstruction.

In regard to the situations at which foreign bodies may become lodged, it is undoubtedly true that, particularly in the case of small pointed bodies which easily penetrate the mucous membrane, this may occur at any point in the course of the œsophagus. Very large bodies cannot as a rule pass the isthmus, and therefore remain fast in the pharynx. Small sharp-pointed bodies, such as fish-bones, bones, and wooden splinters, which project from the morsel of food, may be driven into the wall of the pharynx during the first attempt at swallowing. Larger bodies which have passed through the pharynx most frequently lodge at those places where under normal conditions the œsophagus is constricted or where it is pressed upon by neighboring organs, or at

places where the œsophagus changes its course. The three constrictions of the œsophagus which are the favorite site for stricture caused by caustics as well as carcinoma (v. Hacker) are: 1, the beginning of the œsophagus, behind the thyroid cartilage; 2, the middle constriction, which in some cases is situated at or above the bifurcation of the trachea, in others more in the region of transition from cervical into thoracic portion; and 3, the inferior constriction situated in the region of the hiatus œsophageus (where the œsophagus passes through the diaphragm). In regard to the middle constriction, it has been confirmed that stricture caused by caustics and carcinoma occurs most frequently in the region of the bifurcation, while foreign bodies that have passed the pharynx and the entrance to the œsophagus, and in which no attempts have been made to force them down, most frequently lodge in the region of the superior aperture of the thorax. (v. Hacker.)

In those cases in which the author found foreign bodies lodged in lower portions of the healthy œsophagus (region of the bifurcation, point of intersection with the left bronchus, or region of the inferior constriction) the former had only reached this situation as a result of attempts at forcing them into the stomach with bougies. The spontaneous descent of larger foreign bodies to the deeper portions is probably rare. The lowest point noted is the hiatus, and not the cardia, as is so frequently stated. If a foreign body has once passed the hiatus, it will lodge in the abdominal portion of the œsophagus only under very exceptional circumstances, as this portion is shaped like a funnel, with its smaller opening placed above. The majority of foreign bodies remain lodged in the cervical portion of the œsophagus. Krönlein (Egloff) explains this by the fact that the œsophagus is wedged in between the vertebral column, the larynx, and the thyroid gland, particularly behind the thyroid cartilage, and in the aperture of the thorax. The latter situation might easily be the seat of obstruction, as here the œsophagus, which is surrounded in the neck by soft, non-resisting structures, passes through an unyielding bony ring into the thorax.

Symptoms and Complications.—The symptoms vary according to the situation of the body and according to whether on account of its size and the character of its surface it produces obstruction of the lumen and pressure upon the surrounding structures (larynx, trachea), or causes injury of the mucous membrane or perforation into adjacent organs (arteries). Some foreign bodies act in both ways. If the body is so large that it cannot advance, and if it remains lodged in the pharynx or in the isthmus behind the larynx, it may by pressing on the entrance to the larynx cause attacks of choking, accompanied by cyanosis of the face, attempts at swallowing, and retching.

If a foreign body completely obstructs the œsophagus, food will be regurgitated. This takes place at once if the obstruction is situated high up, but after a little time when it is situated low down. In those cases in which the foreign body acts as an obstruction the patient complains of a dull sense of pressure, referred to a definite point in cases

in which the cause of obstruction is situated high up; while in cases of foreign bodies with sharp edges which cause injury, the patients complain of a stabbing pain occurring at a certain point whenever swallowing is attempted. Even pointed bodies situated transversely in the œsophagus, with their apices embedded in the latter, may cause more or less complete obstruction, particularly in respect to solid food. In most cases, however, patients can swallow fluids or soft particles of food, though such attempts may cause pain. Pain is referred by the patients to the region of the sternum, even if impaction occurs at a lower site. The pain may frequently continue for days, even if the foreign body has passed beyond the point of impaction.

In individual cases even very large foreign bodies have remained unnoticed in the œsophagus for years, till the development of symptoms caused their removal (Lennox Browne, Le Roy, and McLean removed artificial teeth after three and one-half, seven, and twelve years, respectively). But, on the other hand, foreign bodies which are not immediately dangerous from their size, frequently cause inflammation of the œsophagus through injury of the latter.

The complications occurring after penetration of foreign bodies are quite incalculable. Certainly in many cases met with in daily life the immediate danger is removed by forcing the foreign body either up or down. This may require surgical intervention or be accomplished simply by retching or vomiting or by swallowing solid food. In many such cases, however, dangerous conditions may be produced by injuries of the œsophagus or by subsequent lesions of the gastro-intestinal canal. In many cases the results of foreign bodies penetrating the œsophagus are manifested at once or in a very short time. In injuries of the upper portions blood is frequently mixed with the mucus or vomitus. Severe hemorrhage (vomiting of blood) usually occurs only in the most serious cases in which larger vessels are perforated as a result of impacted pointed foreign bodies. But even in these cases this usually occurs only after some time has elapsed. More extensive fatal hemorrhage is frequently preceded by smaller so-called alarm hemorrhages.

The vessel injured may be the aorta (in 17 of 33 cases of fatal hemorrhage, Poulet), the carotid, thyroid artery, subclavian artery, pulmonary artery, superior vena cava, azygos vein, inferior thyroid vein. The heart itself may occasionally be injured. (Andrew.) (Fig. 7.)

Pointed foreign bodies lodging in the pharynx or œsophagus occasionally lead to local abscess and ulceration, in the course of which the foreign body may become loosened and be either ejected or swallowed. Bodies which perforate the pharynx or the œsophagus may appear in an abscess of the neck or at the side of the vertebral column in the back, in the chest, etc. Needles frequently travel a long distance through the cellular tissue and often appear at the surface of the body or the extremities without leading to diffuse suppuration.

Adelmann's statistics show that even needles are dangerous, for of

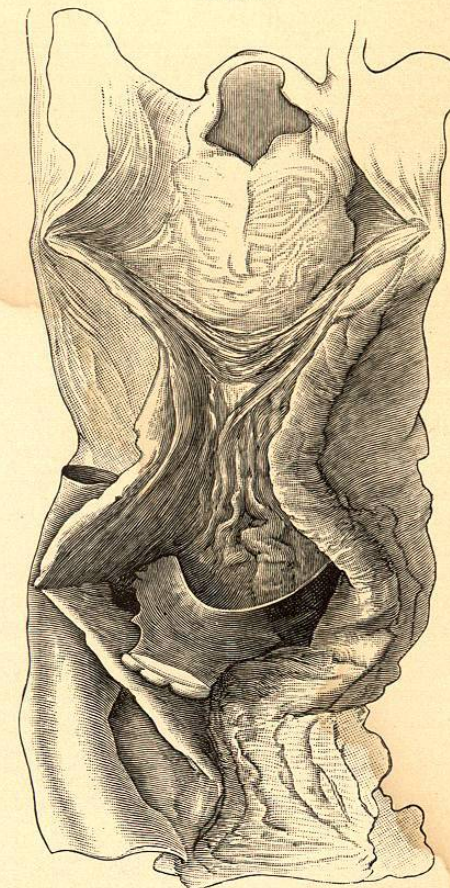
40 cases with needle in the œsophagus death was caused in 8, or in 20 per cent.

Foreign bodies lodging high up in the œsophagus may lead to pressure-necrosis of the larynx and trachea, and in this way bring about perichondritis or stenosis of the trachea, followed by cellulitis of the pleura, lungs, and the mediastinum. (Gerster.) In other cases the decomposition of foreign bodies, caused by the entrance of septic materials and the accumulation of decomposing food, may result in ichorous abscesses of the submucous connective tissue. As a result of the latter the mucous membrane may be elevated toward the lumen of the canal and thus produce considerable stenosis, or where there is rupture into the trachea sudden asphyxia or septic pneumonia may develop. As soon as an abscess has advanced to the peri-œsophageal cellular tissue it may rapidly extend along the latter in different directions. More directly this leads to abscess of the neck, corresponding to the seat of the foreign body; eventually there may occur mediastinitis, pleuritis, pericarditis, erosion of larger vessels, and hemorrhage.

In rare cases, as a result of injuries produced by foreign bodies, spasmodic stricture of the œsophagus may occur. If the injury is repeated or deep, and there is inflammation, cicatricial stricture of the œsophagus may result. It is conceivable that to this class belong isolated cases of stricture of the œsophagus resulting from so-called muscular hypertrophy, particularly in the region of the hiatus, where only superficial ulceration of the mucous membrane was present.

Diagnosis.—A positive diagnosis of penetrating or impacted foreign body can occasionally be made from the symptoms and history. On

FIG. 7.



Perforation of aorta by plate of artificial teeth.
Hemorrhage.