

account of the possible dangers attempts should be made, even in doubtful cases, to determine the presence or confirm the absence of a foreign body.

The pharynx and its environment should be carefully examined by inspection, palpation with the finger, and with the mirror. In most cases, however, the surgeon has to deal with objects which have lodged lower down in the œsophagus. Larger bodies situated in the cervical portion can occasionally be felt from without, along the course of the œsophagus, more frequently on the left side, and sometimes only indistinctly. In other cases there is noticeable tenderness on pressure at a definite point, frequently along the inferior border of the left sternocleidomastoid muscle. If secondary inflammatory manifestations have set in, the patient will complain on moving the neck, there may be a noticeable swelling of the neck, or an abscess. If perforation has occurred, there may be crackling due to emphysema.

Foreign bodies may cause rapid swelling of the thyroid gland, in the form of extensive soft struma which had not previously been present. This may result from venous stases caused by the presence of large foreign bodies lodging for several days at the level of the thyroid cartilage and producing difficult respiration (v. Langenbeck), also in case of foreign bodies injuring and penetrating the thyroid gland (Krönlein (Egloff), Gerster), as a result of thyroiditis or strumitis brought about by septic infection. In case of foreign bodies remaining in the œsophagus (König), as well as in the case of foreign bodies that have been removed from the latter, swelling of the thyroid gland may simulate hæmatoma, and thus lead to incision on the wrong side of the neck for the purpose of controlling a supposed hemorrhage from the mouth.

In most cases, besides inspection and palpation, examination with bougies is necessary, particularly in cases of foreign bodies lodged in the thoracic portion, in order to determine the presence and exact situation of the latter. In case of emergency an ordinary English flexible œsophageal bougie can be employed for this purpose; but a block-tin sound is better, especially one with an ivory olivary tip, or, in case of metallic foreign bodies, a whalebone staff provided with a metal spherical tip or any foreign body sound.¹ On touching a foreign body with the latter instrument a rubbing can be heard or at least felt. Care should be taken that the instrument does not rub against the teeth.

In conducting such an examination it is a good plan to have the head of the patient well extended at the outset or as soon as the instrument has passed the isthmus. A straight instrument if passed in a curve, presses backward, and will therefore glide along the posterior wall of the pharynx. It not infrequently happens therefore that foreign bodies attached to the anterior wall cannot be discovered, particu-

¹ This consists of an English flexible bougie provided with a cylindrical tip of ivory or metal. This instrument is not so liable to be caught by the thyroid cartilage on withdrawing it as the bougie a boule is.

larly if their convex surface is applied to the concavity of the anterior wall. This applies particularly to artificial teeth. If this should be the case, the walls of the œsophagus should be palpated by moving the instrument in various directions. If the contact of a foreign body is felt or there is some obstruction preventing advance of the instrument, the distance the instrument has passed from the teeth should be measured. In graduated sounds the distance is simply read off. It is easy to be deceived as to the level of a foreign body even if the latter has been touched. (Wright.) When the foreign body is placed longitudinally, the sound may touch either its upper or its lower extremity; a coin-catcher may touch a foreign body with either the spring or the hook.

After preliminary examination with the bougie, whether positive or negative, the surgeon should at once proceed to perform œsophagoscopy, provided he has mastered the technic of the latter. In case the preliminary examination was positive, it will be known at once what length of tube is to be employed for removing the foreign body. If the preliminary examination was negative, the entire length of the œsophagus should be carefully examined, for in this case the œsophagoscope must serve the purpose of diagnosis as well as treatment. It is important to mention those cases in which it is assumed from the examination with the sound that the foreign body has descended. Many cases are known in literature in which foreign bodies embedded in the œsophagus were not discovered with the bougie, and caused death.

Very small, pointed, embedded foreign bodies are frequently only discovered on slowly withdrawing the tube, as in inserting the latter, just as in using other examining-instruments, they are covered by a fold of mucous membrane. At the site where the body is situated there will be noted at once a marked redness and swelling of the mucous membrane, small hemorrhage, a tear, a waving shred of mucous membrane, a dull-white area of decubitus, or a loss of substance with a purulent coating. The foreign body will be conspicuous by the contrast of its color with that of the mucous membrane. This is particularly the case with pieces of bone. Removal is frequently easy. In difficult cases one may consider the position of the body, the manner of its attachment, or some way of turning it.

Besides examination with bougies and œsophagoscopy there is a third, the most recent method of examination—examination with the *x*-rays, either by means of the *fluoroscope* or *x-ray photograph*. This method has shown itself practicable in numerous instances. Undoubtedly radioscopy is least irksome for the patient, and in case of suitable foreign bodies (bones, artificial teeth, metallic objects, etc.) it is an important aid to diagnosis and may be of importance in controlling the handling of instruments (forceps, coin-catchers).

It is important in case of foreign bodies situated in the lower portion of the œsophagus, where an examination with the fluoroscope or an *x*-ray exposure for a photograph is to be made, to have the patient in an oblique and not in a dorsal position, in order that the object will

not be covered by the shadow of the vertebral column or that of the heart. (Wilms.)

From the point of view of treatment œsophagoscopy is more useful, as by this method the exact relations of the foreign body to the soft parts can be seen, which is not the case in the *x*-ray picture; and it is possible therefore to carry out extraction in the most conservative manner. *X*-ray exposure is particularly important where œsophagoscopy is contraindicated in cases of abscess, and particularly also in perforation of the œsophagus if the foreign body is situated outside the latter, in which case the site of perforation, but not the body itself, can be discovered by the œsophagoscope.

Prognosis.—Owing to the circumstances that many cases are not seen by surgeons, and that of those that are, only a few are kept under observation and completely published, it is impossible to express in figures the prognosis of foreign bodies in the alimentary passages. Large bodies, both soft and hard, in many cases lead rapidly to manifestations of asphyxia or to actual asphyxia. Sharp, angular bodies producing injury frequently bring about serious danger through perforation, ulceration, and their consequences. Every foreign body in the pharynx or œsophagus may cause serious danger or even death. It should therefore be removed as soon and as conservatively as possible.

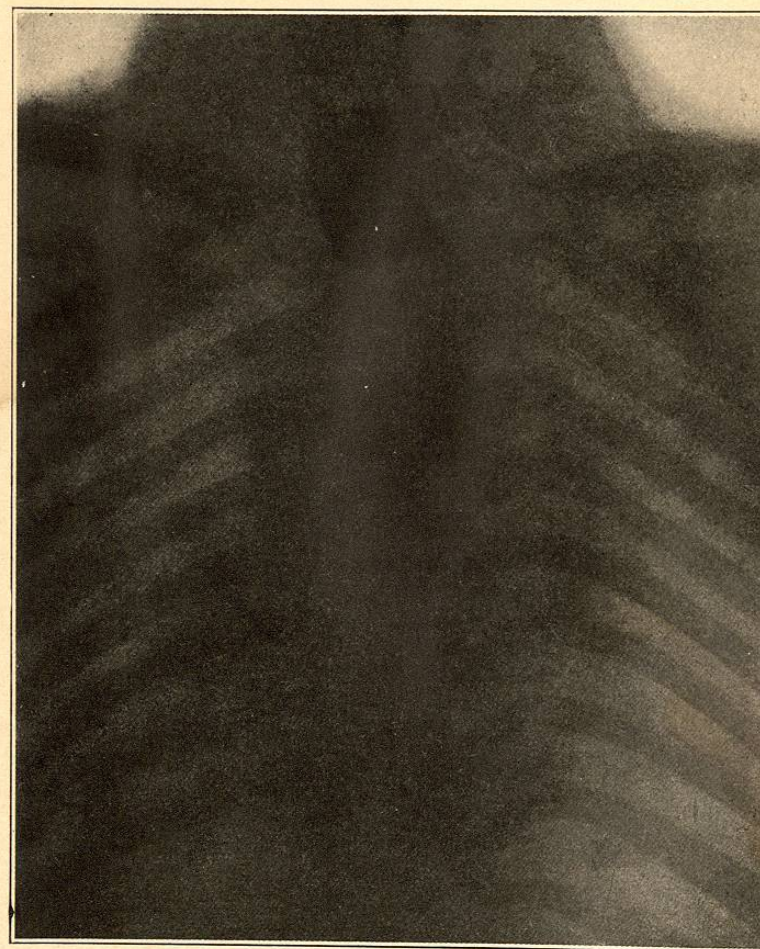
Treatment.—The treatment of foreign bodies should be instituted as soon as the diagnosis has been made. Unfortunately cases usually apply to the surgeon for treatment when complications have already set in as a result of the presence of the foreign body for some time, or as a result of efforts on the part of the patient to remove it (retching, swallowing solid food, use of emetics, etc.), or through attempts on the part of the physician to extract or force it further down.

Where there is danger of asphyxia through impaction of larger bodies (artificial teeth, pieces of meat, etc.) in the lower portions of the pharynx or in the entrance to the œsophagus, it may be possible to remove them with the bent finger, as was successfully accomplished by Dieffenbach and v. Langenbeck among others. If the foreign body cannot be reached with the fingers, a pair of curved pharyngeal forceps should be employed. If there is impending serious danger, tracheotomy must first be performed and attempts at extraction continued subsequently. If the latter are unsuccessful, pharyngotomy or œsophagotomy will be indicated. In case of softer bodies (meat, potato, etc.) attempts may be made to press them against the vertebræ, and by squeezing them render them of such a form as to enable their being swallowed or removed. This removal is carried out by removing successive portions with pharyngeal forceps.

Tracheotomy is necessary in rare cases in which the foreign body has passed the isthmus and is pressing upon the trachea from behind. Usually the efforts on the part of the patient to force out or swallow the body are successful. Dyspnoea can usually be relieved by grasping the larynx and drawing it forward. If in exceptional cases dys-

pnoea is not relieved by tracheotomy, it is due to compression lower down at the bifurcation, as in Ilwraith's case of a child. As there is not sufficient time for œsophagoscopy, attempts should be made to force the foreign body rapidly down with a bougie passed into the œsophagus. It has been recommended to make this attempt in case of dyspnoea even before performing tracheotomy. (W. J. Taylor.)

FIG. 8.



X-ray picture showing plate of artificial teeth in œsophagus at level of upper border of sternum.

In the great majority of cases demanding surgical treatment the surgeon has to deal with foreign bodies that do not produce conditions of acute asphyxia, but are situated lower down in the œsophagus. In these cases must be considered, first, the methods in which no cutting operation is performed, namely, extraction with the aid of œsophagoscopy

or in the absence of the latter; second, extraction through the mouth; or third, forcing the foreign body down into the stomach.

EXTRACTION WITH THE AID OF ŒSOPHAGOSCOPY.—Œsophagoscopy performed after the diagnosis of the site of the body has been made by examination with a bougie, and extraction or pushing the body into the stomach with the aid of the Œsophagoscope, constitutes the sovereign method. In a large number of cases in which removal of foreign bodies could not be accomplished with coin-catcher or forceps, this was rapidly and safely effected by means of Œsophagoscopy even when the bodies were situated in the lowest portions of the Œsophagus. In the same way Œsophagoscopy proved itself useful in removing foreign bodies caught by strictures whose extraction by mouth was almost impossible, and where pushing them down was dangerous, as they completely obstruct the lumen, or if sharp can produce an injury that may have serious consequences. It is an equally significant fact that foreign bodies in the normal Œsophagus, occasionally also in cases of Œsophageal stricture, which obstruct the lumen of the tube, but which are not dangerous on account of their shape and size, frequently glide into the stomach after inserting the tube, evidently as a result of the dilatation of the Œsophagus and peristalsis excited thereby. This is especially noticeable in the region of the hiatus.

Occasionally on advancing the tube artificial teeth lodged in the lower portion of the Œsophagus glide into the stomach. (v. Hacker, Göttstein.) For artificial teeth without metallic plates that have been caught, Killian has devised a method of inserting a galvanocautic loop through the tube, cutting up the foreign body with the latter and removing the different portions. Mikulicz is preparing for this purpose a knife-shaped galvanocautery; the author is preparing one that is hook-shaped.

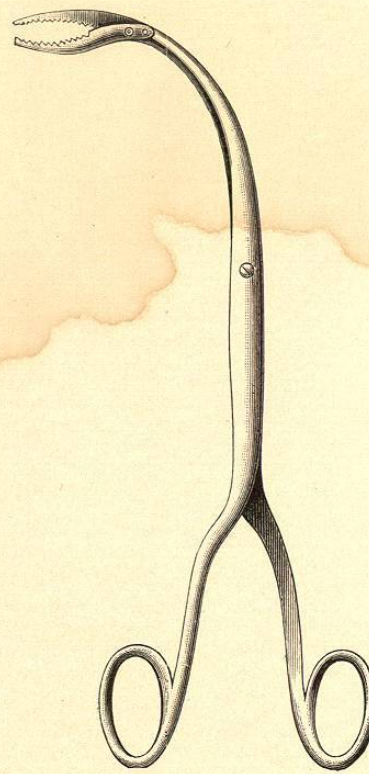
With the aid of the Œsophagoscope the author has been able in a series of 27 cases to remove successfully by one method or another foreign bodies lodged in the normal or constricted Œsophagus without producing the slightest injury to the patient (except in a case of carcinoma), so that since the year 1887 he has not found it necessary to perform Œsophagostomy for foreign body.

Obviously, rational treatment would be limited if removal of a foreign body was to be obtained at any price. In cases in which extraction by conservative methods is impossible because foreign bodies are so firmly embedded, as well as in cases of evident inflammatory or phlegmonous manifestations in the neck, or in the presence of hemorrhage, external operation is indicated. But there are a number of cases in which, by means of Œsophagoscopy, Œsophagotomy or even gastrotomy can be avoided. For this reason, and in order that the surgeon may be able to determine the indications for any necessary operative interference, it is desirable that he be acquainted with this method of examination.

EXTRACTION THROUGH THE MOUTH.—Removal through the mouth should be aimed at in cases of foreign bodies which by their

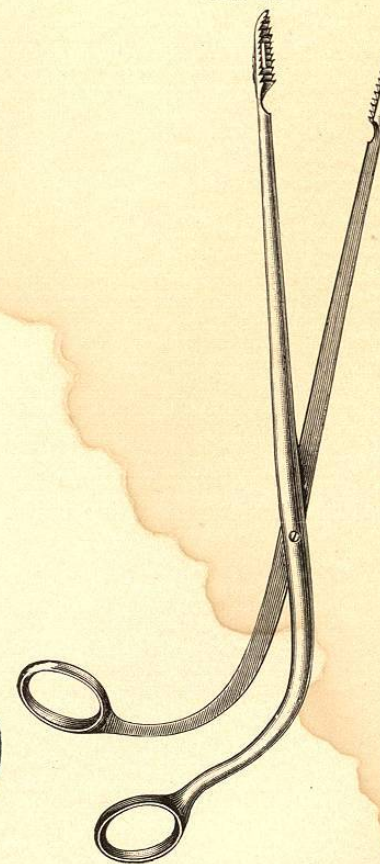
form and character are liable to produce injury, particularly where they are situated in the upper part of the Œsophagus, but only if this can be accomplished without using undue force. The longer a foreign body has been embedded, the more must injury and the consequences of the latter (ulceration, abscess) be considered, and the more cautiously must one proceed unless, where the site of the obstruction is

FIG. 9.



Pharyngeal forceps.

FIG. 10.



Œsophageal forceps.

situated in the cervical portion, it is preferable to perform Œsophagotomy at once. In case of foreign bodies lodged in the thoracic portion careful attempts at extraction should be made, particularly if on account of the situation of the foreign body the conditions are not favorable for Œsophagotomy or for gastrotomy.

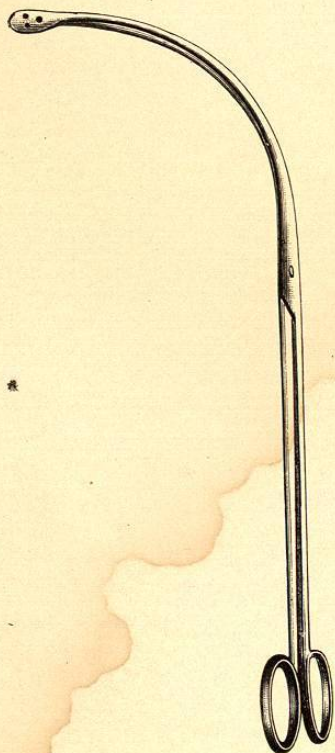
For removal through the mouth the following instruments are employed:

1. Various forms of pharyngeal and Œsophageal forceps. They

are adapted principally to the removal of foreign bodies from the pharynx and the upper part of the œsophagus.

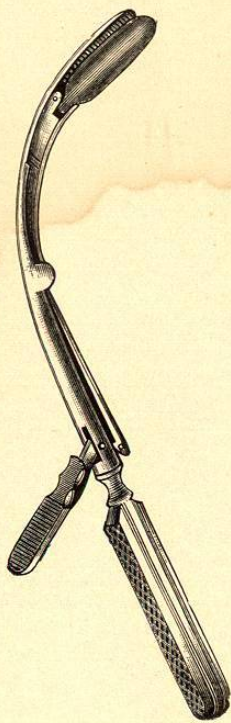
Two forms of pharyngeal forceps are necessary, such as open from before backward like Charrière's (Fig. 9), and longer œsophageal forceps (Fig. 10); also forceps that open from side to side like the ordinary pharyngeal forceps (Fig. 11), and Lutter's forceps (Fig. 12.)

FIG. 11.



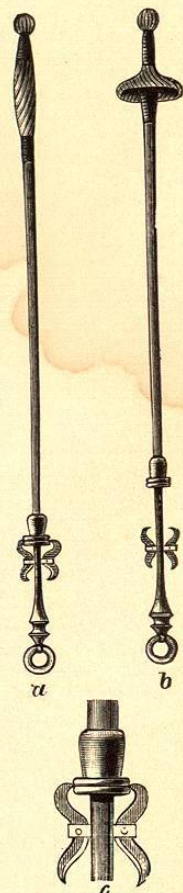
Forceps opening from side to side.

FIG. 12.



Lutter forceps.

FIG. 13.



Weiss fish-bone catcher.

With these instruments it is almost impossible to reach farther than the region of the thyroid cartilage (except with the long œsophageal forceps). They are held in the same way as a bullet-forceps and passed under guidance of the finger.

2. Instruments designed to be passed beyond the foreign body, and which on being withdrawn catch the latter and draw it upward. These instruments are intended principally for objects lodged in the lower part of the œsophagus which do not completely obstruct the latter.

Weiss' fish-bone catcher (brush- or umbrella-probang) is illustrated in Fig. 13, with ring, metal tip, and Sympson's hook contrivance (c). It is passed beyond the foreign body with the bristles folded and held in place by Sympson's contrivance (a); it is then opened like an umbrella (b), and the walls of the œsophagus swept from below upward, the instrument being held with both hands. If by this procedure the probang cannot be withdrawn without using a great deal of force, the bristles are again folded in the same way as when the instrument was passed.

Gräfe's "pharyngeal basket" or coin-catcher consists of a whale-bone staff, one end of which carries a small sponge, the other end being provided with a shallow basket which turns on a hinge, or, more useful still, a smooth double hook movable in both directions. (Fig. 14.) A pharyngeal hook with a rigid, hook-shaped metal loop is not so practicable. With a single hook it may easily happen that the hook is directed to the side away from the foreign body. The movable double hook can more readily be passed between the foreign body and the wall of the œsophagus because it can turn from side to side, and because it more readily catches the foreign body on being withdrawn, as experience has shown. If the first attempt is unsuccessful, the instrument should be again passed beyond the foreign body and then turned upon its axis before being withdrawn. If the hook catches the foreign body, the instrument is first drawn tight in order to test it, and thereupon slowly withdrawn without using great force. Before passing the instrument the patient may be allowed to swallow a little oil or egg-albumin in order to facilitate the passage of the instrument. If after catching the foreign body the instrument cannot be withdrawn without exercising undue force, it should be withdrawn alone. Usually this is easily accomplished by passing it down a little and then rotating about its axis. Cases are known, however, in which this failed after repeated efforts, and in which the coin-catcher had to remain a day or longer till œsophagotomy could be performed.

FIG. 14.



Gräfe's coin-catcher.

PUSHING DOWN INTO THE STOMACH.—A foreign body should not be pushed down into the stomach unless it can safely be assumed that this procedure will not be to the disadvantage of the patient. The cases which are adapted to this method are those in which there are softer bodies, tendinous portions of meat, pieces of potato, etc.; also those in which the bodies are not too large, have smooth surfaces and a spherical form, and which cannot easily be grasped with the above extraction-instruments. The best instrument for this purpose is an ordinary œsophageal bougie with cylindrical tip.

In case of soft bodies in a normal œsophagus, and particularly in the presence of stricture, the following method may be useful: A

conical English elastic bougie is slowly passed between the wall of the œsophagus and the foreign body in order to loosen the latter, and then suddenly pulled back with a jerk. The bougie will then pull away a portion of the loosened body and the remainder will then glide into the stomach by itself or with the aid of a cylindrical bougie. The cylindrical bougie should not be suddenly thrust in, but advanced under steadily increasing pressure.

Where these methods are unsuccessful or in those cases in which they are contraindicated from the outset, a surgical operation for the removal of foreign bodies must be employed. Among these are: (1) pharyngotomy; (2) œsophagotomy; (3) gastrotomy and gastrostomy.

FIG. 15.



Coin-catcher. (Brewer.)

Associated with these as an extreme measure is dorsal œsophagotomy through the mediastinum.

PHARYNGOTOMY.—Pharyngotomy is more fully discussed under injuries and diseases of the nasopharynx. The author may mention here that so far it has only been employed for the removal of foreign bodies from the pharynx (10 cases, Honsell), but never for the removal of foreign bodies from the œsophagus.

ŒSOPHAGOTOMY.—Œsophagotomy is the most important operation in cases of foreign body of the œsophagus and the one most frequently employed. The indications have for the most part been discussed above. G. Fischer has formulated the following general principles, and which assume the presence of a foreign body at a site which renders œsophagotomy practicable:

1. A foreign body recently swallowed, which cannot be removed by other methods, must be removed by œsophagotomy before the end of

FIG. 16.



Horse-hair probang. (Brewer.)

the second day. Impending asphyxiation necessitates immediate tracheotomy.

2. If the foreign body has been swallowed several days previously and one attempt at removal has been unsuccessful, œsophagotomy should immediately be performed.

3. If the nature of the foreign body would render any attempt at extraction or pushing downward unsuccessful, operation should immediately be performed.

4. In cases of existing infiltration of the neck, or if hemorrhage from the mouth has occurred, œsophagotomy should immediately be performed.

It is sufficient to point out here that one of the principal non-bloody methods is œsophagoscopy; that in difficult cases in which, for instance, foreign bodies are lodged in the thoracic portion, the latter method can be employed by means of a short tube inserted through the wound or an artificial fistula. In this way it is possible to obtain a view from a shorter distance than from the mouth, and to ascertain the manner in which the body is caught, how held, and in what way it should be turned, and thus be spared the necessity of performing a gastric operation.

When a foreign body is situated in the thoracic portion and cannot be removed through the mouth by the non-bloody methods nor be pushed down, the question to decide is whether it is better to remove it by means of œsophagotomy or through the stomach. This must be determined by the seat of the foreign body.

Assuming an average length of 25 cm. for the adult male œsophagus, it can generally be said that the beginning of the œsophagus is about as far from the teeth as the cardia is from the bifurcation, or about 15 cm., while the distance from the thyroid cartilage to the bifurcation of the trachea is about 10 cm.

As measurements on the cadaver show that the distance from the sternum to the part of the œsophagus at the level of the bifurcation is about 4–8 cm. in males and 3–6 cm. in females, the average distance from the teeth to the superior aperture of the thorax can be put down as 19–22 cm. in males and 18–21 cm. in females.

Histories of cases published offer little information bearing on this question, as the site of the foreign body is either not stated or else is incorrectly estimated. The majority of foreign bodies removed by means of œsophagotomy were situated behind the larynx, particularly behind the thyroid cartilage and in the region of the superior aperture of the thorax. Occasionally where the foreign body was wedged into the aperture of the thorax difficulty was experienced in grasping it with forceps.

In isolated cases foreign bodies situated 23, 27.5, 28.7, and 33.7 cm. from the teeth were removed (Ström, McLean, Alexander Maunder, etc.). Billroth twice extracted a plum-stone situated several centimetres above the cardia in the case of a woman with a stricture due to swallowing sulphuric acid.

In general, larger foreign bodies wedged fast in the œsophagus cannot be safely removed through the wound with forceps except by the aid of œsophagoscopy unless they can be reached with the finger. These conditions were present in Riedel's case (24 cm. from the teeth, female, twenty-five years old) (Göde). According to Riedel, foreign bodies situated not more than 20 to 26 cm. from the teeth can be removed through an œsophagotomy-wound, provided that it be possible to draw up the œsophagus a little. In case of foreign bodies situated lower down in the thoracic portion œsophagotomy may be attempted, to be followed by gastrotomy if the former is unsuccessful. The œsophagotomy-wound frequently facilitates removal of the foreign body through the stomach.

Technic of Œsophagotomy.—As the œsophagus is situated more to the left, behind the trachea, the operation is as a rule performed on the left side, the patient being placed in a half-sitting posture with the head turned to the right. The operation should be performed on the right side only if there is evidence of an inflammatory phlegmonous process, or if the foreign body has been lodged on the right side for some time and can be felt there, or if it is desirable to divide the wall of the œsophagus on account of inflammatory infiltration or ulceration.

The skin-incision is made along the anterior border of the left sternocleidomastoid from the level of the thyroid cartilage almost to the clavicle. The platysma and superficial fascia are divided along the anterior border of the sternocleidomastoid as far as this muscle, care being taken to avoid injuring the jugular vein. The inner border of the sternomastoid is found and the muscle retracted outward. After dividing the middle fascia of the neck, as well as the omohyoid muscle in case the latter cannot be pulled aside, the dissection is carried on into the deeper tissues, between the left lobe of the thyroid gland, which serves as a guide, and the sternomastoid muscle, both structures being well retracted. The large vessels enclosed in their sheath and the sternocleidomastoid are retracted outward and the sternohyoid and the thyroid gland inward. In the usual cases in which the œsophagus is exposed for a few centimetres below the thyroid cartilage, the superior and inferior thyroid arteries, being situated above and below this space, respectively, can be spared. The superior thyroid artery extends above the beginning of the œsophagus downward and inward across the pharynx. If the œsophagus must be opened lower down, it may be necessary to cut the inferior thyroid artery between ligatures, as after its origin from the subclavian behind the carotid it takes an oblique course, running inward and upward over the œsophagus and crossing the recurrent nerve. If more room is required in exposing the œsophagus as far as the superior aperture of the thorax, the sternal head of the sternomastoid muscle should be divided just as in the case of struma or other tumor. Occasionally, if struma is present, it will be necessary to remove the respective lobe of the thyroid.

The œsophagus will be found at the bottom of the wound, situated to the left of the trachea. It appears as a flattened, rounded band, whose fibres run longitudinally, of a reddish color, and will be recognized possibly by swallowing movements. Behind, can be felt the bodies of the vertebræ covered by the longissimus colli muscle. As the recurrent nerve runs in the groove between the trachea and œsophagus, it is better to open the latter at the side. By inserting an English elastic catheter or a whalebone or tin sound through the mouth, the wall may be pushed outward at this site. Occasionally the latter condition will be produced by the foreign body. Where there is perforation of the œsophagus purulent infiltration and œdema of the surrounding tissues will serve as a guide. The muscular coat

is strong and only loosely attached to the mucous membrane. It is of advantage therefore in incising the œsophagus to hold the wall of the latter firmly with the fingers where it is stretched by the foreign body or over the sound in order that the incision may be carried through the mucosa. The edges of the incision should be immediately retracted by means of two ligatures passed through all the layers. (Billroth.) If the opening be made free hand, it is best accomplished by means of two forceps, grasping first the muscular layer and then the mucosa.

The foreign body is as a rule found lying near the wound or can be felt with the finger. It should be removed with a straight or curved pair of forceps. If this fails, the œsophagus, which should be firmly held by the ligatures, must be opened farther in one direction or the other. If fingers or forceps slip and the foreign body is wedged in, it must be loosened by means of elevators or turned, or occasionally broken up with bone-forceps. (Lawson.)

In case of foreign bodies that are liable to produce injury care must be taken to prevent the edges of the wound from being torn during their removal. Where foreign bodies are situated in the lower thoracic portion removal may be facilitated by gently drawing up and stretching the œsophagus. Under these circumstances œsophagoscopy through the wound should be considered. In a number of cases foreign bodies were not found after operation or they disappeared in the course of the latter, having passed into the stomach unnoticed as a result of relaxation of the œsophagus during anæsthesia or as a result of the incision.

After-treatment.—The wound of the œsophagus should be sutured in those cases only in which the latter was not contused during extraction, in which the foreign body was present for a short time only, and in which no inflammatory manifestations, pressure-necrosis, or ulceration is present. Either catgut or silk is employed for suturing. In order to prevent separation of the sutured edges by muscular contraction the mucosa and the muscular layer can be sutured separately. But even this will not absolutely prevent separation. Even under the most favorable circumstances suturing is not followed by primary union, and generally only prevents or limits the escape of food during the first period. It is advisable therefore to drain the rest of the wound with iodoform gauze, following which the skin-incision, with the exception of its lower angle, can be closed. In all cases in which primary union is not to be expected a drain or stomach-tube should be passed into the œsophagus as far as the stomach and the wound about the tube filled with iodoform gauze in order that pressure of the tube will not cause necrosis. In doubtful cases it is better to adopt the open method of treatment, as experience has shown that the period of recovery is not materially shortened by suturing. If the wound in the œsophagus is not large, it soon contracts, and recovery may be completed in twelve or fourteen days, which is about the same time in which suturing is successful, as the cases in Billroth's clinic, among