

Original Articles.

THE TREATMENT OF STRICTURE OF THE ESOPHAGUS.¹

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I NEED not here discuss the pathology of strictures of the esophagus. The accepted methods of treatment for both neoplastic and cicatricial strictures are familiar to you all. I think you will agree that, with the methods thus far employed, some new method of dilating cicatricial strictures would be welcome, if it should be rapid and comparatively safe.

During the past winter I have devised some procedures for the treatment of cicatricial stricture, which have met with such perfect success that I venture to ask your attention while I describe them.

The first requisite for dilatation of an esophageal stricture is to get some instrument to pass through the esophagus. In some cases all attempts to pass an instrument by way of the mouth fail. In a certain proportion of these cases, after performing a gastrostomy, it is possible to make an instrument engage in the cardiac orifice of the esophagus and push it up into the mouth. But sometimes even this is not successful. I had such a case during the winter. I could pass an instrument neither from above nor from below. I overcame the difficulty in the following way: The apparatus consisted of a glass of water, an ordinary drinking tube and a piece of black silk thread. I threaded the tube so that the end of the thread was at the mouth end of the tube. The patient then drank water through the tube. The thread was washed along in the current of water, and as it disappeared up the tube more thread was fed into the glass of water. When several feet of thread had been thus washed down, I fished the lower end of the thread out from the stomach by passing a bent probe into the gastrostomy opening. This was entirely successful at the first attempt. On trying it subsequently, however, I failed, because my patient, who was a child, had taken a dislike to the procedure and snarled the thread with his tongue, thus preventing its washing down.

This new difficulty I overcame as follows: To a glass funnel I attached a piece of rubber tubing, and to this, by a piece of glass tubing, a small rubber catheter, the tip of which had been cut off. A thread was washed down from the funnel until its end appeared at the end of the catheter. The rubber tubing was now pinched to stop the flow of water and thread, and the catheter inserted into a nostril until its end hung in the pharynx. A swallow of water was now allowed to flow from the funnel, and then the tube was again pinched. Water was thus intermittently fed down the esophagus, the thread going with the stream. After

several feet of thread had disappeared down the funnel, I fished the lower end of the thread out through the gastrostomy opening, as before.

Before trying to wash a thread down the esophagus of my patient, I first tested the feasibility of doing so upon an artificial esophagus. I have made a similar one to show you now. It is made of glass and rubber tubing. The funnel above may represent the pharynx. The channel passes from the neck of the funnel through a piece of rubber tubing and a piece of glass tubing, and then by means of a perforated cork into a glass tube of large calibre. This is intended to represent a dilated pouch above a stricture. The exit below from the large tube is by a small glass tube which passes half an inch into the large tube, to represent the mouth of the stricture as lying at a higher level than the bottom of the pouch. Thence the channel is continued by a piece of rubber tubing, by a piece of glass tubing which takes a circular turn in a vertical plane and then makes a sharp and constricted lateral bend, and the channel finally ends by a rubber tube having a diameter of about one-sixteenth of an inch. I will introduce a thread into the neck of the funnel, and then keep the funnel filled with water and gradually feed in the thread. The thread is carried by the current of water through the whole system without difficulty. Should it be arrested at any point, a momentary pull will disengage it and allow it to pass on.

Having passed a thread from the nostril to the gastrostomy opening, my next hope was to dilate the stricture by using the method devised by Dr. Robert Abbe and used with perfect success in a case reported by him a few years ago. His method consists in putting the stricture upon the stretch by engaging in it a conical gum-elastic bougie, and then sawing the stricture by pulling back and forth a stout thread passing through the stricture. In attempting to use this method I first pulled through a double thread of strong silk. By means of one of the two resulting threads I pulled through a piece of stout linen fish line; by the other one I attempted to draw into the stricture a conical gum-elastic bougie having an eye at its tip, to which the thread was attached. I was unable to make the bougie engage in the lower end of the esophagus, even when it was thus guided by a thread.

I then devised the wire-and-spindle bougies which I will show. Each consists of five feet of steel wire having a tiny knob at each end, and carrying at its middle a conical piece of metal. I had a series of these made, carrying spindles of different diameters, the smallest being No. 10 French and the largest No. 30.

These wire-and-spindle bougies I used in the following way: The fish line was drawn through the esophagus. The wire of a bougie was then attached to a thread and pulled through the esophagus until the spindle was arrested at the stricture. One end of the wire and of the fish line now projected from the mouth, the other ends from the gastrostomy opening. To guard the soft parts of

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the pharynx and of the stomach, I made two guide tubes, which consist of aluminum tubing, one bent to pass into the pharynx behind the larynx, and the other bent to pass through the gastrostomy opening and up to the cardiac orifice. The wire and fish line were drawn through these tubes above and below. Tension was then made upon the wire above, and the fish line was drawn back and forth. The wire began to yield, and soon the spindle was heard and felt to click against the upper guide tube, showing that a way had been cut for it through the esophagus. Larger wire-and-spindle bougies were then successively cut through in the same way, a No. 30 French being the largest I considered desirable, as my patient was only three years old.

The foregoing procedures apply to cases in which it is necessary to open the stomach, because no instrument can be made to pass from above.

In those cases in which it is possible to pass an instrument from above, I need not remind you of the dangers of attempting to dilate by forcing down the usual conical bougies. To avoid these dangers I devised an instrument, by means of which the idea of cutting the stricture with a string can be carried out by working entirely from above without opening the stomach. I have used this instrument with complete success this spring, and therefore venture to present it to you.

The instrument consists of a stout staff of whalebone, to the end of which is screwed fast an olive-shaped piece of metal. This olive is pierced by two tunnels. One is a curved tunnel having its convexity towards the end of the instrument and its two ends opening opposite one another well forward of the greatest diameter of the olive. This curved tunnel is accomplished by making two borings, which meet at an angle. The sharp crest where the borings meet is smoothed down by boring through a string covered with wet emery powder. Unless the metal is thus smoothed, the cutting string will itself be quickly chafed in two.

The second tunnel begins at the base of the olive, to one side of the screw, which attaches it to the whalebone staff, and passing diagonally through the olive, ends at its tip. This tunnel I will call the guide-tunnel. The instrument is held to its course in the esophagus by what I may call a guide-bougie. This consists of an urethral bougie cut off to a length of seven or eight inches. A steel wire passes through the lumen of the bougie. One end of the wire terminates in a metal tip at one end of the bougie. Where the wire emerges from the other end of the bougie it is soldered to a metal tip on the bougie and then extends beyond it some three feet. To shield the soft parts of the pharynx from the scraping of the string while cutting, I made a guard to hold the strings close to the whalebone staff. This guard consists of a handle to which are soldered two wires. These wires run along the whalebone staff and carry three wire loops encircling the whalebone, by means of which the guard may

slide along the staff. The wires also carry two sets of lateral eyes, in which the cutting strings may play to and fro. The strings are thus held away from the soft parts.

The method of using this instrument is as follows: An olive a little larger than the stricture is screwed to the whalebone staff. The two ends of the string which passes through its string-tunnel are threaded through the eyes of the guard. If the patient be a child, he is best seated in the lap of an assistant, with the shoulders resting against a pillow in front of the assistant, and the head thrown back over the top of the pillow, the mouth held open by a gag. A guide-bougie is chosen of such size that it will readily pass the stricture. It is introduced until all but the wire has disappeared behind the epiglottis. The end must then be in the stomach. As no force is required in passing this guide-bougie, it cannot make a false passage. The wire of the guide-bougie is now threaded through the guide-tunnel of the olive, and the olive slid along the wire until its tip comes in contact with the bougie portion of the guide-bougie. By pulling upon the wire and pushing the staff, the guide and olive become now virtually one instrument. As the guide is necessarily in the esophagus, the olive must follow it and cannot make a false passage, even if a fair amount of force is used. One thing must be guarded against—kinking the wire where olive and bougie meet, by failing to direct the staff towards the esophagus, while the olive is still in the pharynx. Attention to the position of the patient and proper handling of the whalebone staff will prevent this from happening. When the olive is arrested by the stricture, the guard is slid along the staff until its end is beyond the epiglottis, and then an assistant pulls the string to and fro, pulling parallel to the staff to make as little friction as may be. Moderate pressure is made upon the staff, which causes the olive to put the stricture on the stretch, and the strings cut a passage for it. As the olive descends, the guide-bougie coils up in the stomach. Owing to the slight force required to coil the bougie in the stomach, the olive may not, when it has cut through the stricture, plunge suddenly into the stomach. It is not, therefore, safe to wait for a sense of lessened resistance as an indication that the olive has passed the esophagus. The safe plan is to mark the bougie at the point which should be at the incisor teeth when the olive is in the stomach. For a child of two years, ten inches should be right.

After cutting strictures by the foregoing instruments, it is of course necessary that bougies be passed at intervals, to guard against new contractions. I hesitated to pass the ordinary bougies, for fear of making a false passage at the cut portion of the esophagus. I therefore had made a set of hollow bougies, which could be passed on a guide. They are ordinary gum-elastic bougies, with the ends cut off and a perforated conical metal tip screwed on. In my case, which had a gastrostomy, I pulled a wire from the stomach wound up through the mouth, and using this as

a guide, slid these hollow bougies down the esophagus until their tips appeared on the abdomen. Subsequently, I first introduced one of the guide-bougies such as is used with my stricture-cutter, and making sure that this had gently found its way to the stomach, I felt no hesitation in pushing down a No. 30 hollow bougie. This has been done at intervals of about a week. The gastrostomy wound has nearly closed spontaneously.

In the case operated entirely from above, the guide-bougie is also used to carry hollow bougies and maintain the dilatation. This patient is 18 months old, and a No. 27 French bougie is passed.

A DISCUSSION OF THE INDICATIONS FOR OPERATION IN GASTRIC ULCER.¹

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OUR experience in the operative treatment of gastric ulcer has been considerably widened in the past few years, and yet I think little of practical value has been added to our knowledge of the indications for operation which were so excellently set forth by Leube and Mikulicz at the German Surgical Congress in Berlin in 1897. They well recognized the limitations of medical treatment in dealing with this troublesome disease, and we can add but little to the discussion of that part of the subject.

The changes which have taken place since then in our knowledge of this subject have been mainly in the line of improved surgical technique and consequently lessened danger from operative measures. As the risks of operation diminish, we have to frequently readjust our ideas as to the persistence with which medical treatment must be tried before resort is had to surgery.

Too often the question of operative interference in gastric ulcer has been postponed, not only until medical treatment has been long and evidently a failure, but even until the patient's condition has become desperate.

Let us see whether surgery offers a sufficient prospect of relief in this condition to encourage our medical brethren to call us earlier, while the patient still possesses the strength to endure a somewhat serious operation.

In order to properly present the indications for operation in gastric ulcer, it is necessary first to give a moment to the consideration of the different operations on the stomach which may be made useful in the various phases of this disease. These are: (1) Gastrotomy, including the excision of ulcers; (2) gastroplication, or turning in of the stomach wall to close an ulcer that has perforated, or to strengthen the wall at a point where perforation is threatened; (3) pylorectomy, for the removal of an ulcerating pylorus; (4) pyloroplasty, for the widening of a pylorus contracted by ulceration; (5) gastro-enterostomy, to provide a short cut into the intestine from a

stomach whose motility is interfered with by ulceration.

Gastrotomy and the excision of ulcers has so evident an application in cases where the ulcer can be located and reached, that nothing need be said in explanation of it for the purpose of this discussion. The same is true of gastroplication, which is plainly the proper procedure for closing small perforations. Pylorotomy, too, needs no especial consideration here, as it simply amounts to the mechanical removal of the diseased portion when situated at the pylorus.

When we come, however, to pyloroplasty and gastro-enterostomy, we have operations which have a wider range of usefulness than any of those mentioned. Their utility in relieving obstruction at the pylorus due to cicatricial contraction is plain and readily understood, but it has been further abundantly shown that these operations, particularly gastro-enterostomy, have a very decided influence in promoting the healing of ulcers, even when there is no evidence of pyloric obstruction. It is to be remembered in this connection, however, that even when no obstructing lesion is discoverable by inspection and careful examination at the time of operation, we are still not justified in concluding that the pylorus offered no harmful resistance to the passage of stomach contents into the intestine. For we know that spasmodic contraction of the pylorus plays a prominent part in some gastric conditions, and there is reason to suspect that it must be reckoned with far oftener than has hitherto been supposed. If such spasm has been of long duration, a thickening of the muscular ring about the pylorus may be recognizable, but a moderate spasm excited temporarily and intermittently by the irritation of food may play an important part in prolonging and aggravating an ulcerative process in the stomach wall and yet lead to no appreciable muscular hypertrophy. Whether we attach much importance to pyloric spasm or not, it is certain that a gastro-enterostomy is usually followed by a great amelioration of symptoms and by the disappearance of the excess of hydrochloric acid, which plays so important a part in the production of gastric ulcer.

It is also of great significance that a gastric hemorrhage is frequently brought to a standstill by a gastro-enterostomy. This result follows the operation so immediately as to suggest that the overactive peristalsis of the organ is quieted as soon as an ample drainage is afforded for its contents.

Mr. Mayo Robson lately reported a recent case of his in which, after repeated severe hemorrhages, he operated during an attack of bleeding, and had an almost immediate cessation of it.

The mere correction of the hyperacidity could hardly have produced so immediate an effect, but the cessation of the active struggle of the stomach to free itself might well follow directly on the operation which gave the contents free exit, and this would seem to be the most plausible explanation of the quick effect produced in these cases.

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