

Case Report
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## Successful treatment for corrosive esophagitis and gastritis caused by potassium hydroxide Report of a case

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We report a case of successful reconstructive operation of severe corrosive esophagitis, which developed for the full length of the esophagus. A 32-year-old man ingested a handful of potassium hydroxide with a large amount of alcohol and many hypnotic pills intending to commit a suicide. He was transferred to an emergency medical care center ten hours later. He underwent emergency procedures such as gastric lavage, infusion of activated carbon and laxative. And the patient survived. However, he had a severely corroded esophageal constriction due to alkaline reaction. He underwent mediastinoscopy assisted transhiatal esophagectomy and reconstruction using an isolated jejunal segment with vascular anastomosis. This operation was considered useful and safe for a corrosive narrowing and cicatricial stricture of the esophagus.

(Key word : Corrosive esophagitis, Suicide attempt, Alkaline solution Jejunal interposition reconstruction)

### Introduction

Corrosive esophagitis is a rare condition in the usual clinical practice,<sup>1,2,3)</sup> and is only rarely experienced in an emergency medical care unit. Most of the patients with this condition may either die or suffer from partial corrosive esophagitis. And the cicatricial stricture of the esophagus that develops following corrosive esophagitis causes reduction of the food intake and subsequent malnutrition.

We report a rare case of corrosive esophagitis caused by the ingestion of potassium hydroxide. The patient ingested the chemical with the intention to commit a suicide. The esophagitis was present for the full length of the esophagus. A successful reconstructive surgery was carried out, and the quality of life of the patient improved significantly after the operation.

There is no report such as same surgical reconstruction for corrosive esophagitis as far as we can search by using the website of PubMed and Japan Medical Abstracts for the last decade.

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### Case report

A 32-year-old man was admitted to our hospital with a cicatricial stricture of the esophagus. The patient had been suffering from dysphagia and an eating disorder on admission. The patient ingested a handful of pipe cleansing chemical solution with a large amount of alcohol and many hypnotic pills to attempt a suicide. The pipe cleansing chemical was a potassium hydroxide solution. He was found by his family while severely vomiting, and was taken to an emergency medical care center ten hours after the ingestion of the chemical solution. He underwent emergency procedures such as gastric lavage with milk and activated carbon and laxatives. With these treatments, the patient escaped from death. However, he developed a corrosive esophageal constriction due to alkaline reaction. His esophagus with severe inflammation changed into a narrow tube and peristaltic movement was lost. He began to suffer from dysphagia, and eventually it became impossible for him to drink water or eat foods. Hence, he had been given a total parental nutrition. Two months later, he was transferred to our hospital for the reconstructive surgery. Laboratory data showed slight anemia (Hb : 10.7g/dl), hypernatremia (Na : 152mEq/l) and a mild inflammatory reaction (WBC : 4250/mm<sup>3</sup>, CRP : 1.0 mg/dl). And the patient was in a condition of malnutrition.

On the 2nd day after the onset of taking a handful of pipe cleansing chemical, an upper gastrointestinal endoscopy was performed. The endoscopy was done relatively easily and the scope was passed into the stomach. On endoscopy, a severe erosive esophageal mucosa was observed from the inlet of esophagus. The entire stomach also showed mucosal changes caused by the chemical ingestion. (fig. 1) On the 9th day after the onset, stenosis along the full length and all around of the esophagus was observed on the second upper GI-endoscopy. Eventually, pyloric stenosis developed and a large amount of gastric juice was accumulated in his stomach. A thin naso-gastric tube was inserted to evacuate the gastric juice. On the 24th day, an endoscopic examination was unsuccessful because of the cicatricial stricture of the esophagus.

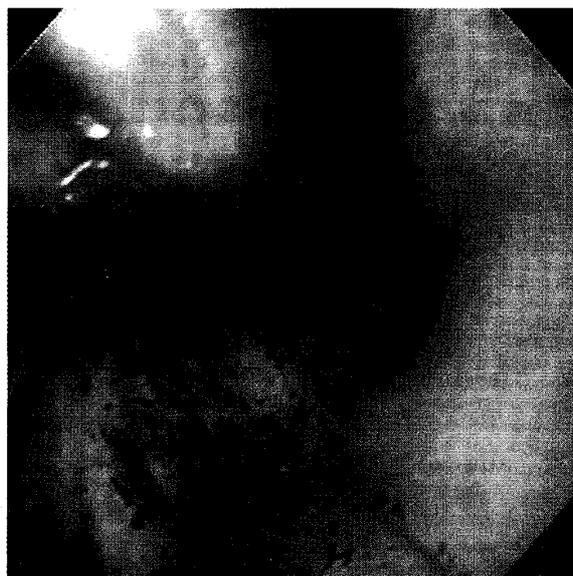


Figure 1 Upper gastrointestinal endoscopic finding (the 2nd day)  
Endoscopic examination showed the severe erosion of the whole esophagus.

Approximately 1.5 liters of gastric juice was evacuated through the naso-gastric tube every day and about 2.5 liters of saliva was also removed everyday. On the 63rd day, barium X-ray examination revealed that only a small volume of barium was passed through the esophagus along the naso-gastric tube. The barium in the stomach did not move into the duodenum owing to the complete pyloric stenosis. (fig. 2a, 2b) A total parenteral nutrition was performed to improve the nutritional status and to maintain the body fluid.

Mediastinoscopy assisted transhiatal esophagectomy without thoracotomy was performed at three months after he was admitted to the hospital. At laparotomy, a standard upper midline incision was made, and collar incision was made at the supraclavicular region. And then, a transhiatal blunt dissection of the esophagus was performed. The dissection of lower esophagus was relatively easy; on the other hand, the dissection of the upper esophagus and the middle esophagus was technically difficult because of the fibrosis caused by the inflammation. Particularly the dissection of the middle part of esophagus was extremely difficult. Therefore we dissected the part of esophagus with the help of the mediastinoscopy. This scope was significantly useful to avoid injury of vessels such as innominate artery and vein. On the cervical site, the bilateral vagal nerve, phrenic and recurrent laryngeal nerves were identified clearly. These nerves and larynx were dissected without injury and were preserved. Finally a sufficient space behind the sternum was developed by mediastinoscopy assisted blunt dissection upward to meet the similar space from the neck. The total esophagus was pulled out from the mediastinum

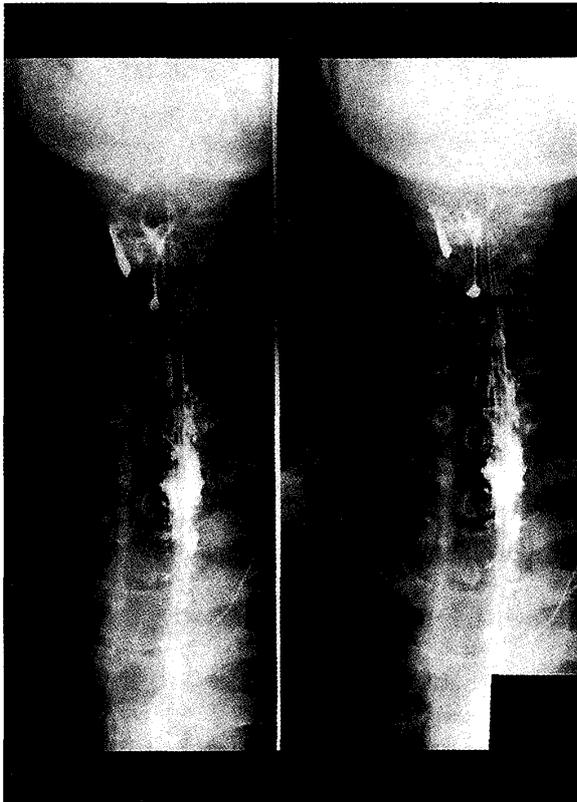


Figure 2a Barium X-ray examination of the esophagus (the 63rd day)  
Barium X-ray examination revealed the severe narrowed esophagus.

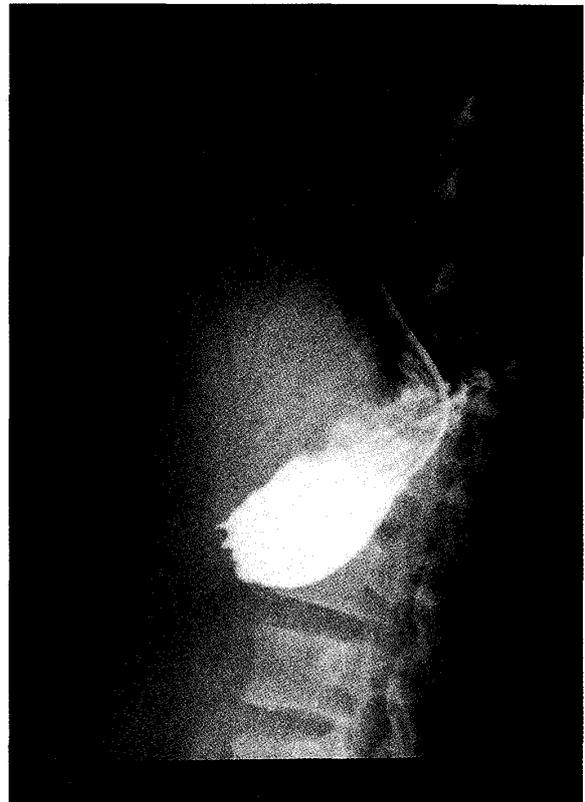


Figure 2b Barium X-ray examination of the stomach (the 63rd day)  
The barium was interrupted according to the complete pyloric stenosis.

safely. In the reconstruction of the esophagus, subcutaneous route was selected because of the safety. In this case, stomach was not suitable for the reconstruction of esophagus because the stomach had a severe inflammatory change with a significant wall thickening, resulting in a complete gastropyloric stenosis and the deforming shortness of lesser curvature. Therefore, either the right colon or the small intestine with blood vessels was considered as the organ for reconstruction. However, neither organ could be mobilized to the cervical area, because both mesocolon and mesentery were shortened due to the inflammatory change of alkaline reaction. Eventually we decided to use a segment of isolated jejunum measuring approximately 20cm in length. The details of reconstructive pathway were as follows. The end of the residual esophagus was anastomosed to the side of the jejunum by using a standard two-layer inverting hand sewn technique. And then, revascularizations between the first jejunal branch and left transverse cervical artery, left internal jugular vein were performed by using operating microscope. Blood supply was delivered to the interposed jejunum of about 20cm in length by the revascularization, and a stable homodynamic was confirmed. Although the stomach was shortened due to the inflammation, the blood circulation of the stomach was maintained. Hence, we decided to use the damaged stomach to interpose the pathway. The lower end of the isolated jejunum was anastomosed to the anterior surface of the damaged stomach in two layers. Furthermore, the lower side of the stomach was anastomosed to the side of the jejunum as described in figure 3. Finally, the end-to-side jejunojejunal anastomosis was made to complete a Roux-en-Y type gastro-jejunal anastomosis. (fig. 3a, 3b)

In this case, the xiphoid process was removed, because it would interfere with the pathway of reconstructive gastrointestinal route. We took meticulous care to preserve the reconstructed

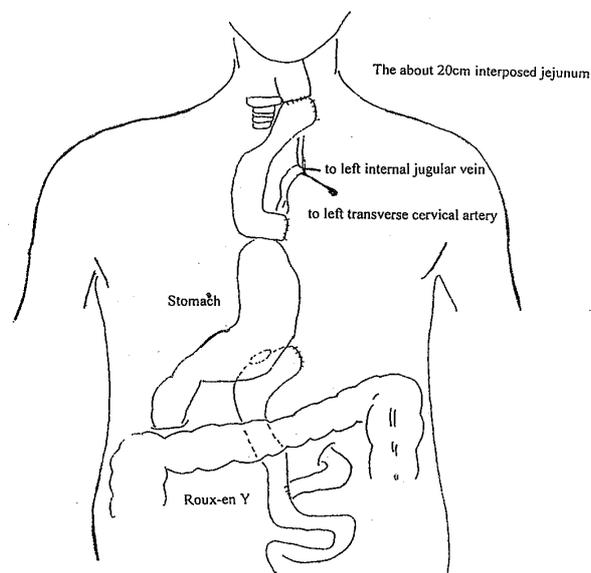


Figure 3a The schema of reconstruction of this surgery

The details of reconstructive pathway were as follows. The residual esophagus, the interposed jejunum, the shortened stomach, and then the lower end of the isolated jejunum were anastomosed sequentially. Finally, a Roux-en-Y type gastro-jejunal anastomosis was added. Revascularizations between the first jejunal branch and left transverse cervical artery, left internal jugular vein were performed.



Figure 3b the photography of reconstruction of this surgery  
The reconstruction was performed by the subcutaneous pathway as indicated.

blood flow. An approximately 4cm open window was constructed to monitor the blood supply of the transplanted jejunum.

During the postoperative course, for 7th days after the operation, a 10000 unit of heparin sodium was administrated to prevent postoperative blood coagulation. And the patient had MRSA pneumonia and transient bilateral recurrent laryngeal nerve paralysis after the surgery, but he recovered from both condition. On the 32nd days, upper gastrointestinal X-ray revealed that gastrografin could be passed easily from the inlet of esophagus to the stomach. However, the passage to duodenum was not yet observed. When a semi-solid diet was started 1 month after the surgery, the aspiration of the diet did not occur. On the 59th day, the patient recovered completely and was discharged from the hospital without any swallowing disturbance. There was no hoarseness at the time of the discharge.

### Discussion

Corrosive esophagitis is found only rarely in a medical field<sup>1,2,3)</sup> and the mortality rate of corrosive esophagitis by taking alkaline or acid solution due to suicide attempt is considered to be relatively high. When patients were rescued, they would develop a cicatricial stricture of the esophagus, which occurs as a consequence of corrosive esophagitis. The esophageal stricture causes a reduction in patient's ability to take diet and maintain nutrition. And they suffer from swallowing disturbance; thence narrowing of the esophagus significantly decreases their quality of life. The methods of treatment for the strictured esophagus are surgical procedures, endos-

copic balloon dilatation<sup>4)</sup> and expandable metallic stent<sup>5)</sup>. The latter two methods are less invasive and safer than the former. Generally speaking, we achieve significant results in endoscopic techniques and procedures currently. Especially in the cases of unresectable esophageal carcinoma, these endoscopic procedures have been indicated to alleviate the symptoms caused by the stenosis<sup>6)</sup>. Endoscopic treatments can be indicated for the cases of short segment stenosis. However, such endoscopic procedures are often not successful in the cases with extensive stenosis, and also the possibility of developing cancer in the damaged esophagus is another problem. Endoscopic treatments were not chosen in our present case, because endoscopic procedures were not suitable for the severely narrowed corrosive change extending for the entire length of the esophagus. Hence, we considered that surgical procedure was the only way to improve the difficulty of swallowing. In the treatment of corrosive esophagitis, an early phase operation is too difficult to dissect the esophagus from the surrounding tissue because of the severe inflammation, and the incidence of postsurgical complications is higher than that of a late phase operation owing to the poor nutritional status. Therefore we deferred the operation until the nutritional status improved and the inflammation subsided. In general, preoperative waiting period may be from 3 months to 6 months. Inflammation may decrease over 3 months, but atrophic scarring will not improve. Hence, we decided to perform this operation over three months after the onset.

We selected mediastinoscopy assisted transhiatal esophagectomy without thoracotomy, because this was not a malignant disease and it was not necessary to dissect lymph nodes. The conventional transhiatal esophagectomy<sup>7)</sup> has a possibility of bleeding and neurological damage and some other intraoperative complications. On the other hand, the operation technique assisted by mediastinoscopy is significantly useful and safe to dissect an atrophic corroded esophagus throughout the mediastinum and to avoid vessel injury and neurological damage. We usually select the anterior mediastinum pathway in the esophageal surgery. In this case, we decided to use the subcutaneous pathway and the isolated jejunum for the reconstruction.<sup>8,9,10,11)</sup> Because the patient had a corroded and narrowed esophagitis along the full length and full circumference of the esophagus, and neither the right colon nor the small intestine with blood vessels could be mobilized sufficiently. The main point in this method is to keep blood supply of the isolated intestine. Furthermore, we constructed an open window for monitoring blood supply and removed the xiphoid process. In particular, the open monitoring window would be useful to find out the disturbance in blood circulation. A 10000 unit of heparin sodium was administrated to maintain the blood flow of the jejunum used for reconstruction during the 7 postoperative days. Postoperative bleeding was not observed. Therefore the mediastinoscopy assisted transhiatal esophagectomy is considered to be a safe and a useful way for the reconstructive surgery in our patient with corrosive esophagitis. It was considered that with the usage of the mediastinoscopy and clipping, it became possible to divide proper arteries of the esophagus safely without causing troublesome bleedings. The cause of transient bilateral recurrent laryngeal nerve paralysis was thought to be the inflammation of the surrounding tissue of laryngeal nerve and not to be the injury by the surgical procedures.

So far as we searched the previously published articles, there were no reports similar to this

operation, because most of the corrosive esophagitis leads to death or to a partial cicatricial stricture of the esophagus. We consider that a successful operation was carried out in our patient who recovered from the severe corrosive esophagitis. The recovery of the patient was considered to be due to the appropriate selection of the operative procedures.

The possibility of the gastric cancer that would be induced by chemical stimulation and atrophic strictured change should be considered in the future. Hence, a periodic upper gastrointestinal endoscopy is essential to check up his stomach that was used for the reconstruction.

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## 水酸化カリウム服用による腐蝕性食道炎の一手術例

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## 要 約

我々は水酸化カリウム服用による自殺企図後、食道全長全周にわたる高度の瘢痕性狭窄を来した腐蝕性食道炎に対して手術施行し、良好な QOL の改善を得たので報告する。症例は 32 歳、男性。自殺企図にて多量のアルコールと睡眠剤と一緒に手のひら一杯の業務用配管清掃剤（水酸化カリウム含有）を服用した。10 時間後に救急病院へ搬送され、直ちに胃洗浄され、次いで牛乳と共に活性炭および下剤を投与さ

れ、一命をとりとめた。しかしながらアルカリ反応に引き続き起こる瘢痕性食道狭窄により摂食障害・栄養障害をきたした。そこで、縦隔鏡補助下経横隔膜食道切除術および遊離小腸移植による再建術を施行した。この術式は、腐蝕性食道炎に引き続き起こる高度の瘢痕性狭窄を来した症例に対して安全で有益な手術方法であると考えられた。