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Single Port Trans-gastric Reversal of High Gastric Reduction

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How I do it

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Abstract

Introduction- Stomal stenosis is common following high gastric reduction or vertical banded gastroplasty for obesity. Open and laparoscopic approaches for reversal can be problematic due to expected adhesions from previous surgery.

Method- A technical description of a novel approach for reversal of stomal stenosis following high gastric reduction is provided. This minimally invasive technique combines both “trans-gastric” and “endoscopic” principles for intraluminal reversal via a single portsite incision.

Results- We describe our early experience in 8 cases with this technique highlighting its advantages and discussing potential pitfalls to be avoided to maximise its use and efficiency. It appears to be simple, safe and widely applicable.

Conclusion- The single port trans-gastric, laparo-endoscopic technique provides a simple and effective minimally invasive method of reversing gastric stapling procedures without the need for extensive adhesiolysis.

Key words

Vertical banded gastroplasty, high gastric reduction, reversal, stoma stenosis, single port, trans-gastric, endoscopy

Introduction

Gastric stapling, vertical banded gastroplasty (VBG) or high gastric reduction (HGR) and its variants were in common use in Australia over the last 30 years [1]. Whilst often achieving laudable weight loss results, many patients are now returning with pouch dilation and stomal stenosis (with or without staple line failure) and consequent problematic dysphagia and reflux.

Confronted with these problems, the bariatric surgeon often considers revision to another form of bariatric surgery [2, 3]. In such cases, surgical dissection of adhesions, reversal of the outlet stoma and performance of a secondary weight loss procedure is the usual course. However, on occasion, patients or clinicians may choose to simply "reverse" the stapling without concomitant secondary procedure. In some circumstances, it may be prudent to stage a definitive procedure by offering reversal alone in the first instance and delaying definitive secondary bariatric surgery.

Especially when undertaken laparoscopically, adhesions from previous open surgery may still make reversal alone time consuming, technically challenging and potentially morbid. Reversal may take the form of removing the sutures or band encircling the stoma of the gastric pouch with or without endoscopic dilation; or division of the stoma and septum through a gastrotomy deploying a linear cutting stapling device across the stoma to cut and widen it.

We introduce a novel, minimally invasive technique used to reverse HGR that is simple and efficient. This may be used as a definitive technique or part of a staged procedure. The technical description and presented results of this consecutive series describes consistent applicability with low morbidity.

Method- Single Port Trans-gastric Endoscopic Technique

The patient is anaesthetised, positioned supine on the operating table and prepped and draped to expose the abdomen. A gastroscope is introduced and negotiated beyond the stoma of the gastric pouch. The stomach is then insufflated via the gastroscope and transillumination used to identify a potential point of access through the gastric wall into the antrum of the stomach. A "seeker needle" is used to confirm a point of ready access.

A small (approx. 15mm) incision is made over the chosen point of access and deepened through the rectus fascial layers and peritoneum. Typically omental adhesions will be encountered which are divided using diathermy and progressively swept aside with swabs until the gastric wall is exposed at the wound.

Stay sutures are then placed and a gastrotomy made. A 12mm blunt tip balloon self-retaining laparoscopic trocar with (Applied Medical "Kii Balloon Blunt Tip System- 12 x 100mm" (Figure 1) is then introduced securing the gastric wall against the abdominal wall and allowing "trans-gastric" access (Figure 2). The gastroscope provides direct vision of this process.

A laparoscopic linear cutting stapler can now be introduced via the laparoscopic port into the stomach, distal to the stoma. The gastroscope provides vision to guide the stapler across the stoma of HGR (Figure 3 & 4). When fired, the stapler cuts the stoma, thereby widening it and correcting stomal stenosis and dividing the staple line septum (Figure 5 & 6). Repeat firings if necessary are readily performed and excellent views of the gastro-oesophageal junction are provided to avoid inadvertent injury to this area. It is advisable to use a laparoscopic stapler with short cartridge – 45mm. This facilitates easier access and deployment of the stapler when the intraluminal space distal to the stoma is limited.

The staple line is checked for haemostasis. Should there be any bleeding, standard laparoscopic diathermy equipment may be introduced under vision from the gastroscope or indeed trans-oral endoscopic techniques may be applied.

The gastrotomy is then delivered into the wound via the stay sutures and closed. An air leak test can be performed using the gastroscope for insufflation and saline in the wound.

The abdominal wound is then closed in layers.

Results

Given the ease of technique, short operative time and quick recovery, we undertook a total of 9 cases (Table 1). All patients had previously had open gastric stapling with either vertical or transverse upper abdominal incisions.

Operative time was generally very short, straightforward cases averaging around 30 minutes. The mean operating time for the entire series was 50 minutes (22-90min). There were three cases of prolonged (>60min) operating time where technical difficulty was encountered. In one case, the stoma was unable to be negotiated by the endoscope to facilitate placement of the transgastric port. Hence conventional laparoscopy was used to facilitate the placement of two intraluminal ports and allow stapled division of the stoma. Had a paediatric endoscope been available, this could have been avoided. In the second case, the operator became disoriented with the endoscopic vision and trauma to the lesser curve of the stomach occurred. A second intraluminal port was placed and the injury repaired by suture from within the stomach. In the third case, the gastric pouch was unusually long and hence the space distal to the stoma was limited. This created difficulty in manipulation of the stapler across the stoma and prolonged the operating time. In none of these cases were there

significant post-operative problems. The mean BMI of patients was 36 (28-45) and mean hospital stay was 26rs (16-48hrs)

Discussion

In recent years, gastric stapling (VBG or HGR) has been in declining use due to the emergence of late complications such as stomal stenosis, pouch dilation, staple line dehiscence and gastro-esophageal reflux. Poor tolerance of solid foods often leads to maladapted eating patterns and subsequent weight regain. Van Gemert and co-workers determined that 56% of VBG patients ultimately require surgical revision for one of these complications, most commonly related to stomal stenosis [4]. Endoscopic therapy in the form of dilation is usually ineffective due to suture or mesh ring reinforcement of the stoma and generally dissection and removal of the reinforcing material is required for relief. Use of a stapling device across the stoma to re-establish gastric continuity after gastric partitioning is an established technique and a laparoscopic version was described by Bird and co-workers in 1997 [5]. Laparoscopic reversal of VBG or HGR is characterized by prolonged operating time due to adhesions. In a recent series, the mean operating time for reversal was 149 min with 33% complication rate [6]. Even accounting for cases where technical difficulty was encountered, the mean operating time in our series was 50 minutes. Laparoscopic reversal may be sufficiently challenging that open revision remains popular [7].

Our technique avoids the risks and longer operating time associated with laparoscopic or open reversal. In general, it is a simple, minimally invasive procedure accomplished with readily available equipment and is within the remit of any general or upper gastrointestinal surgeon with standard endoscopic and laparoscopic skills. By avoiding the need to dissect adhesions, risk of perforation is minimised and time is saved. The internal division of the stoma further minimise risk of leak from the staple line.

The technique relies upon careful open cut down onto the stomach wall. Care must be taken during this process to ensure that the presenting wall of the stomach is fully mobilised to allow delivery into the wound sufficient to place retention sutures and allow easy closure of the gastrotomy at the completion of the procedure. It is conceivable that the limitation to this technique applies to patients with disproportionate subcutaneous tissue resulting in poor visualisation of open cut down onto the stomach wall. However, in our current series, we had no issues undertaking this for patients up to a BMI of 45. During this dissection, the omentum may obscure the stomach wall and gauze swabs can be useful to sweep and pack the omentum from the operative field. It may be advisable to "tag" the gauze with a suture or tape to avoid "losing" it in the wound, particularly if the patient is obese.

The vision provided by the gastroscope is generally excellent and allows precise negotiation of the gastro-oesophageal junction as one nears the top of the septum, hence facilitating protection of this critical anatomy. However, care must be taken under gastroscopic vision since instrument movement may be paradoxical (i.e left / right and up / down parallax) creating disorientation as seen in one of our cases in the series. Careful attention to orienting the gastroscope avoids this. In addition, as highlighted in the cases where technical difficulty was encountered, there are anatomical considerations in patient selection that may be important. A long pouch may leave diminished space distal to the stoma making stapler manipulation tedious. We used a 45mm stapler but in such cases a 30mm cartridge length may avoid the problem. A very tight stoma may obstruct the endoscope. Dilating the stoma or using a paediatric scope may circumvent this problem so planning for this is recommended.

This technique is effective in relieving stomal obstructive symptoms and is ideal if one is planning a staged approach to further bariatric surgery as it does not interfere with the operative field for later surgery. If obesity is an issue in future, our philosophy is to offer the

patient a Roux-en-Y gastric bypass. Alternatively, if reversal is the only desired outcome, this technique is an efficient method to achieve this.

Some are critical of the technique of stomal division arguing that complete division of the stoma invariably leads to inevitable weight regain through loss of restriction whereas simple removal of retaining sutures offers some residual stomal restriction without obstruction and limits weight regain. The subject of weight regain after simple reversal is a contentious one. In our experience, many patients with stomal issues may have already regained weight from dysfunctional eating. Series examining this subject suffer from short-term follow up [8]. However in the event of only removing the sutures at the stoma, it is usual that with time, the stoma dilates further and loss of any restriction would be the normal course regardless.

We have only performed this operation on patients with a suture based HGR. However it may also be applicable in cases of VBG provided the material used at the stoma is suitable for an endoscopic stapler to cut and staple through. The commonest form of VBG in Australia uses polypropelene mesh and reversal by applying a linear cutting stapler across the stoma has been shown to be effective and safe [7]. We recognise that various materials (eg. silicone ring) have been used to create this restricted stoma according to local practice. We do not have direct experience in the safety of endoscopic staplers traversing some of these materials. Hence one would have to take due care in patient/ material selection before applying this technique

Conclusion

The single port trans-gastric technique provides a simple and effective minimally invasive method of reversing gastric stapling procedures without the need for extensive adhesiolysis.

Conflict of Interest

All authors certify having no disclosures, grants or commercial interests.

References

1. Jamieson AC. Why the operation I prefer is the Modified Long Vertical Gastroplasty. Obesity Surgery. 1993 Aug; 3 (3): 297-301
2. Tevis S, Garren MJ, Gould JC. Revisional surgery for failed vertical-banded gastrosplasty. Obesity Surgery. 2011 Aug; 21 (8): 1220-1224
3. Marsk R, Jonas E, Gartzios H, Stockeld D, Granstrom L, Freedman J. High revision rates after laparoscopic vertical banded gastrosplasty. Surgery for Obesity and Related Diseases. 2009 Jan-Feb; 5 (1): 94- 98
4. van Gemert WG, van Wersch MM, Greve JW, Soeters PB. Revisional surgery after failed vertical banded gastroplasty: restoration of vertical banded gastroplasty or conversion to gastric bypass. Obesity Surgery. 1998 Feb; 8 (1): 21-28
5. Bird PA, Jamieson AC. Functional laparoscopic reversal of a long gastroplasty. ANZ Journal of Surgery. 1997 Oct; 67 (10): 734-735
6. Tevis S, Garren MJ, Gould JC. Revisional surgery for failed vertical-banded gastroplasty. Obesity Surgery. 2011 Aug; 21 (8): 1220-1224
7. Thoreson R, Cullen JJ. Indications and results of reversal of vertical banded gastroplasty (VBG). Journal of Gastrointestinal Surgery. 2008 Nov; 12 (11): 2032-2036
8. Froyen J, Rosseland AR, Helsingen N. Endoscopic diathermy incision in the treatment of stoma obstruction after gastroplasty for obesity. Endoscopy. 1985 May; 17 (3): 91-93

Table 1- Consecutive series of single port trans-gastric reversal of high gastric reduction

Age (years)	BMI	Operative Time (mins)	Length of stay (days)	Technical Difficulties	Complication
60	36	32	1	Nil	Nil
56	35	39	2	Nil	Nil
59	40	32	1	Nil	Nil
55	33	75	2	Nil	Nil
62	28	22	1	Nil	Nil
51	45	85	2	Visual Disorientation	Lesser Curve Injury
64	42	30	1	Long Pouch- Restricted working space	Nil
59	38	36	1	Nil	Nil
64	28	90	1	Tight Stoma	Nil

Figure 1- Applied Medical "Kii Balloon Blunt Tip System- 12 x 100mm, trans-gastric view.

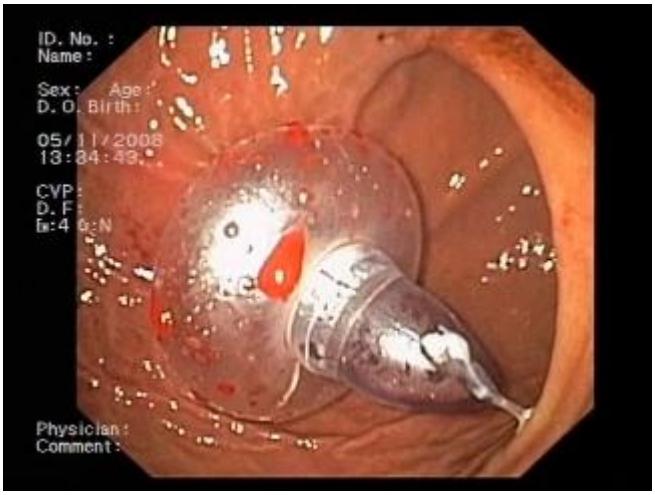
Figure 2- Applied Medical "Kii Balloon Blunt Tip System- 12 x 100mm, external view. Note previous Kocher and midline incision.

Figure 3- Stapler Endopath^{TM} 60mm, 3.5mm staple cartridge (Ethicon, Johnson & Johnson) (cartridge arm only) across stoma

Figure 4- Approach to single port trans-gastric reversal of high gastric reduction

Figure 5- Grasper points at stomal stenosis of high gastric reduction (before reversal)

Figure 6- Post reversal of stomal stenosis of high gastric reduction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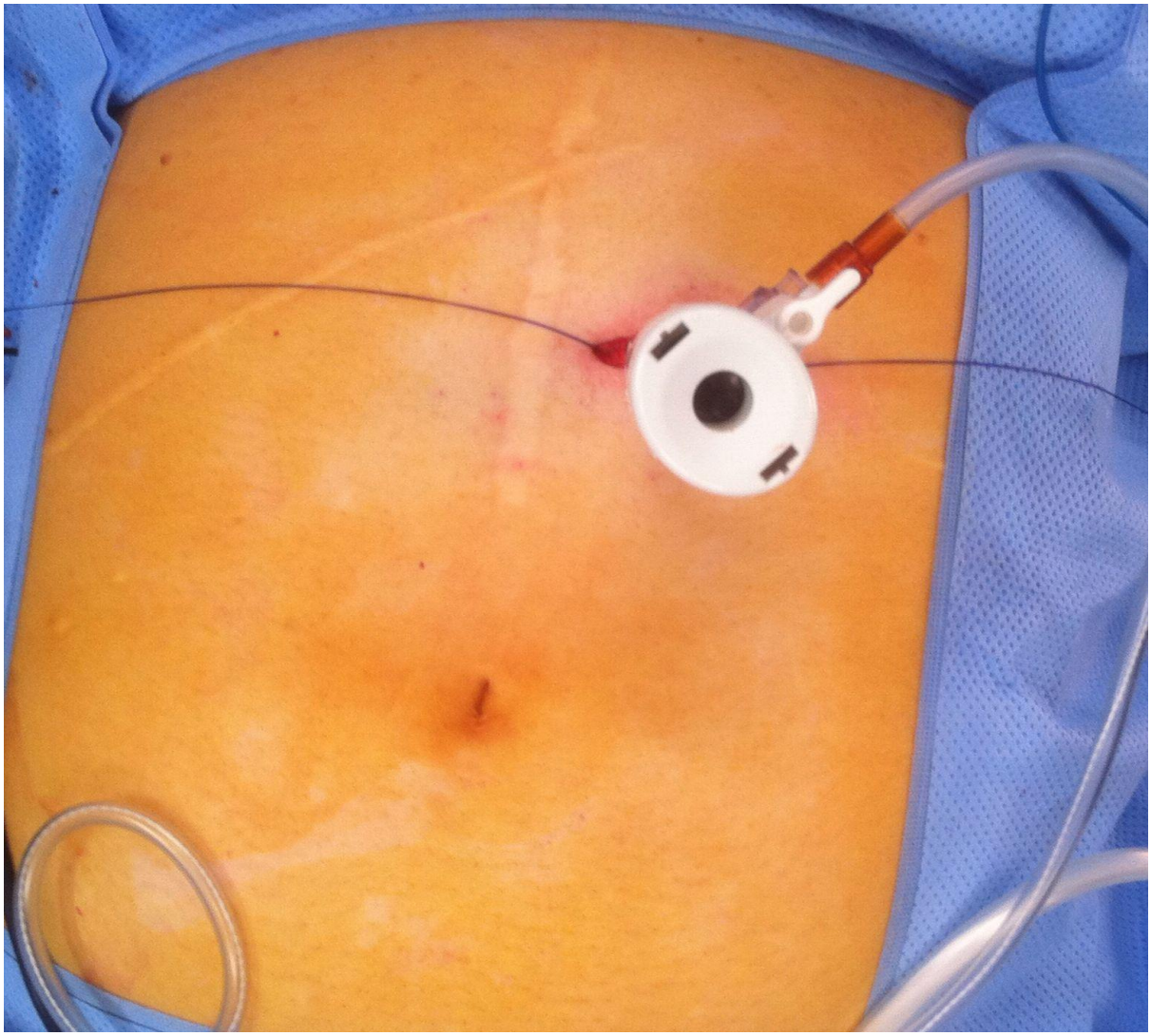

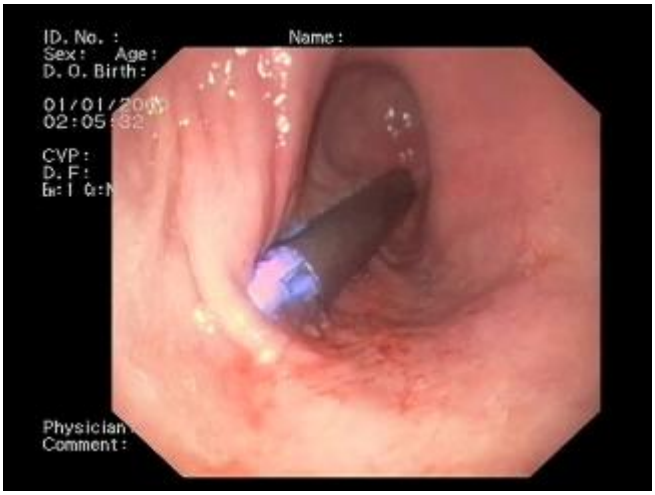
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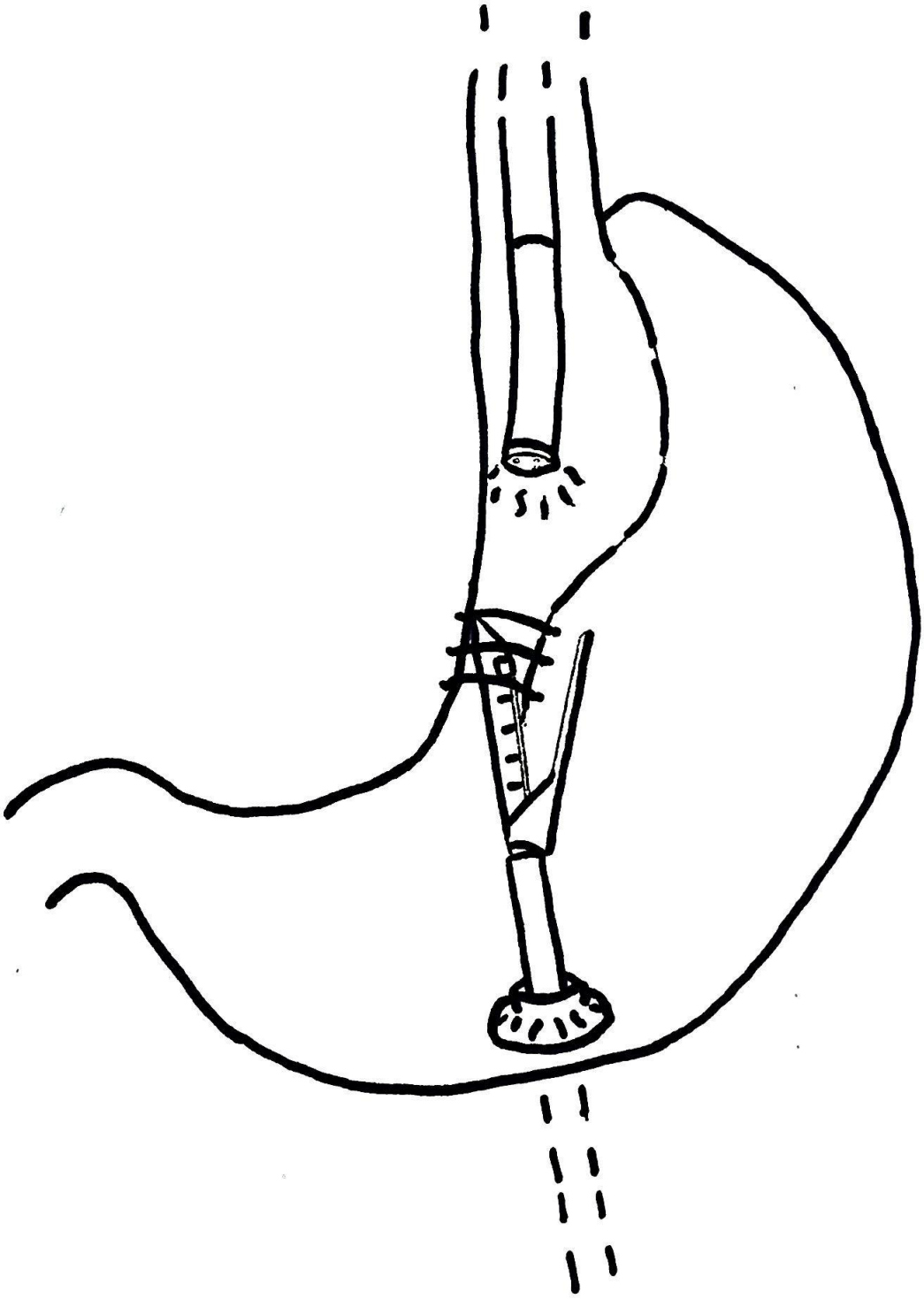

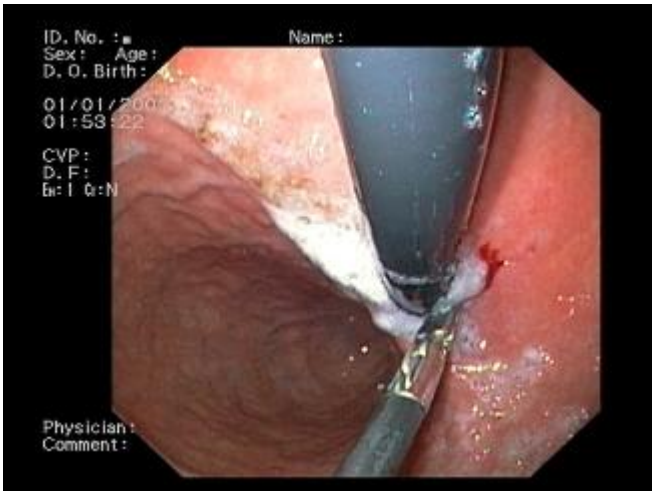
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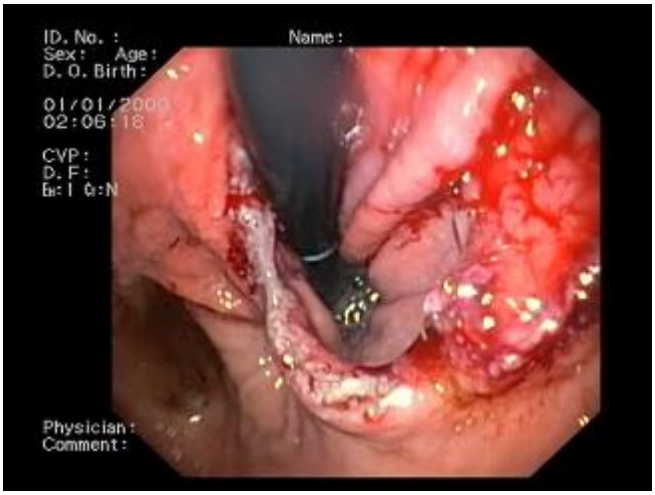
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