

Endoscopic management of gastric band erosions: a 7-year series of 14 patients

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Background: Intra-gastric band migration is an unusual but major complication of gastric banding. We review our experience with endoscopic removal of eroded gastric bands.

Methods: We retrospectively evaluated the cases of 110 morbidly obese patients who underwent adjustable gastric banding between 2005 and 2012 to identify those who experienced band erosion. To remove the migrated band, we used an endoscopic approach with a Gastric Band Cutter.

Results: Band or tube erosion occurred in 14 patients (12.7%). The median time interval from the initial gastric band placement to the diagnosis of band erosion was 32 (range 18–52) months. Upper abdominal pain, port site infection, loss of restriction and weight regain were the most common symptoms. We used the Gastric Band Cutter to remove the band endoscopically. It was able to cut the band successfully in all but 1 patient, in whom twisting of the cutting wire required conversion from endoscopy to laparotomy. In 2 patients, the band, after being cut, was locked in the gastric wall and required laparotomic removal. In 1 patient, we performed surgery for intra-gastric penetration of the connecting tube broken close to the band.

Conclusion: The Gastric Band Cutter was successful in dividing the band in all but 1 patient, although we could not always complete the procedure endoscopically. Endoscopic removal seems to be effective and safe for band erosion.

Contexte : La migration intragastrique de l'anneau est une complication rare, mais majeure du cerclage gastrique. Nous faisons le point sur notre expérience du retrait endoscopique des anneaux gastriques érodés.

Méthodes : Nous avons évalué de manière rétrospective le cas de 110 patients atteints d'obésité morbide qui ont subi un cerclage gastrique ajustable entre 2005 et 2012 afin de vérifier si les anneaux en place étaient érodés. Pour retirer les anneaux qui avaient migré, nous avons utilisé l'approche endoscopique et un dispositif pour sectionner l'anneau gastrique.

Résultats : L'anneau ou le tube s'est érodé chez 14 patients (12,7 %). L'intervalle médian entre la pose initiale de l'anneau gastrique et le diagnostic d'érosion a été de 32 (entre 18 et 52) mois. La douleur abdominale haute, l'infection du port d'accès, la diminution de la restriction et la reprise de poids ont été les symptômes les plus fréquents. Nous avons utilisé un dispositif pour sectionner l'anneau gastrique afin de retirer l'anneau par voie endoscopique. Le dispositif a permis de sectionner l'anneau avec succès chez tous les patients sauf 1; dans ce dernier cas, une torsion du fil à sectionner a nécessité la conversion de l'endoscopie en une laparotomie. Chez 2 patients, une fois sectionné, l'anneau est resté emprisonné dans la paroi gastrique et a nécessité une extraction laparotomique. Chez 1 patient, nous avons effectué une intervention chirurgicale en raison de la pénétration intragastrique de la tubulure de raccord sectionnée à proximité de l'anneau.

Conclusion : Le dispositif servant à sectionner l'anneau gastrique a bien fonctionné chez tous les patients sauf 1, même si les interventions n'ont pas toutes pu être entièrement réalisées par voie endoscopique. Le retrait endoscopique semble être une intervention efficace et sécuritaire dans les cas d'érosion de l'anneau.

Adjustable gastric banding has rapidly become the restrictive procedure of choice in bariatric surgery since its introduction in the early 1990s.¹⁻³ The reasons for its success are related to the ability to obtain adequate weight loss without the need for gastric resection or modification of the anatomy of the stomach and intestine. The reversibility of the procedure and the ease of operating laparoscopically enable early discharge from hospital and a rapid recovery.

Despite these well-recognized results, some long-term complications may occur: most frequently pouch dilatation, port disconnection and intragastric band erosion and migration. Band migration occurs in 0.6%⁴ to 11%⁵ of patients within the first 2 postoperative years. Different hypotheses have been suggested to explain this complication: damage of the gastric wall during band implantation,⁶ infection of the band site,⁷ overfilling the band⁸ and abnormal reaction of the periprosthetic tissue to the presence of the band.⁹

Different methods are used to remove the band, with the preferred methods involving a laparoscopic or laparotomic approach. An endoscopic approach with a device designed to cut the band (the Gastric Band Cutter, AMI) has been proposed, especially when the band has almost completely migrated into the stomach.¹⁰ In our study, we review our experience with endoscopic removal of eroded gastric bands using this special endoscopic instrumentation.

METHODS

We carried out a retrospective analysis of all 110 patients who underwent laparoscopic adjustable gastric banding (LAGB) in the General Surgery Unit of our hospital between January 2005 and January 2012 to identify those who experienced band erosion. Soft Gastric Bands (AMI)

and the MiniMizer Extra adjustable gastric bands were used for gastric banding.

We gathered data on weight loss and symptoms from patients' follow-up visits, and we contacted those who had not attended the 6-month follow-up by telephone to obtain this information. An evaluation with endoscopy was performed for symptomatic patients and those who regained weight. In total, 36 (32.7%) patients underwent gastroscopy. Endoscopic views of the migrated bands are represented in Figures 1 and 2.

To remove the migrated bands, we used an endoscopic approach with the Gastric Band Cutter (AMI; Fig. 3). The procedure always took place in an outpatient endoscopy unit with the patient under intravenous propofol sedation. First, the port was removed surgically under local anesthesia, and then the cutting wire of the device was introduced into the stomach through the working channel of a gastroscope, passed around the band visualized in the stomach, and retracted with the gastroscope. The upper ends of the wire were introduced into an external narrow metal tube and passed into the tourniquet of the handgrip. The metal tube (containing the cutting wire looped around the intragastric band) was passed through the esophagus to the stomach. By twisting the handle of the Gastric Band Cutter, the band was readily cut under direct vision by strangulation (Fig. 4) and was then extracted by gentle traction with the rest of the catheter through the mouth.¹¹ Finally, the gastroscope was again introduced to check the integrity of the gastric wall. The next day, we administered Gastrografin to exclude any leak before discharging the patient.

The study was performed in accordance with the Declaration of Helsinki, and all participants provided written informed consent.

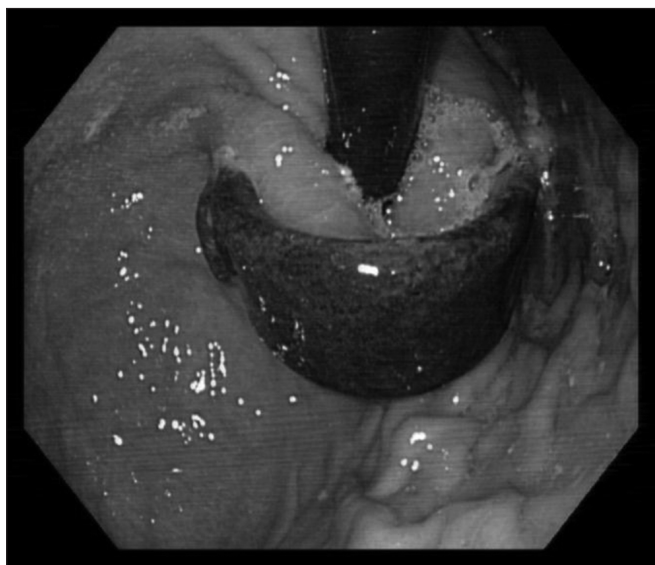


Fig. 1. Endoscopic view of intragastric migration of a Soft Gastric Band (AMI).

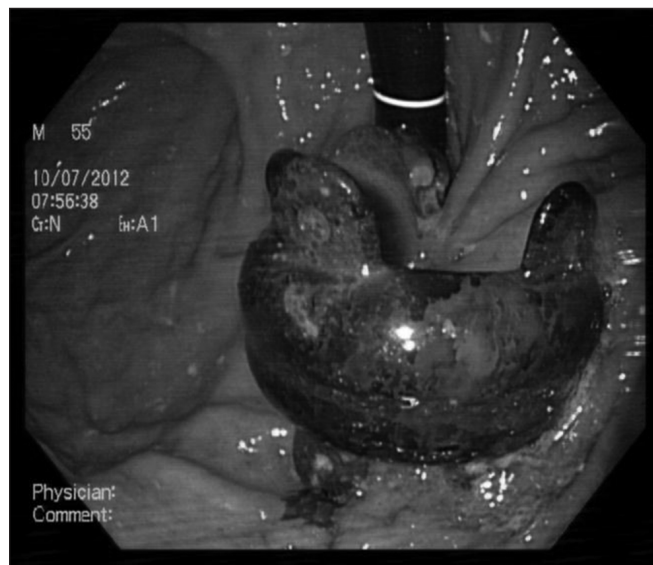


Fig. 2. Endoscopic view of intragastric migration of a MiniMizer Extra adjustable gastric band.

RESULTS

Band or tube erosion occurred in 14 of the 110 patients (12.7%). In these 14 patients (10 women, 4 men), the diagnosis of erosion was made at a median time interval of 32 (range 18–52) months after the operation. The mean preoperative body mass index (BMI) of patients with erosion was 45.3 ± 9.0 ; at the time of diagnosis of erosion, the mean BMI was 33.2 ± 8.9 . The mean age at the time of diagnosis was 36.9 (range 22–55) years. The most common symptoms were epigastric pain (36%), weight regain (29%) and port site infection (29%).

We attempted endoscopic removal in 13 of 14 patients; the procedure was successful in 10 (77%) patients. The median duration of endoscopic removal of the gastric band was 25 (range 15–40) minutes. No complications were observed. All patients regained weight after discharge from the hospital.

Table 1 reports the type of band, the presenting symptoms, the maximum pressure of inflation, the time of diagnosis and the procedure and method used to remove the band in each of the 14 patients.

In 2 patients (no. 2 and 4), it was impossible to remove the bands after the endoscopic cutting because the bands were firmly fixed by adhesions and sutures outside the stomach. In these patients, the MiniMizer Extra adjustable gastric bands had been implanted by laparoscopy. This band has 10 elastic loops on the sides (5 on top and 5 on the bottom), which can be connected directly to the stomach. At least 2 more sutures had been placed anteriorly at the top side of the band and 2 more at the bottom side, through the loops during LAGB. We had to convert to open surgery to remove the bands.

A technical problem occurred in 1 patient (no. 11): the

cutting wire, after being passed around the band and retracted, got twisted in the esophagus and was blocked in the area of the cardia, making it impossible to remove both the wire and the band. The procedure had to be converted to a laparotomy to remove them.

Two patients (no. 6 and 9) had histories of pregnancy after the LAGB, which could have led to band erosion.

In 1 patient (no. 13), the connecting tube penetrated into the stomach (Fig. 5). The gastric band could not be seen on an abdominal computed tomography (CT) scan (Figs. 6 and 7) or during laparoscopy in this patient. Only the port and catheter tubing could be extracted surgically. To our knowledge, this is the first case of a broken tube penetration into the stomach in the literature. In this patient, a CT scan of the abdomen (Figs. 6 and 7) showed that the port was in the normal position in the left upper abdominal quadrant and was connected with the tube, that the band was not found

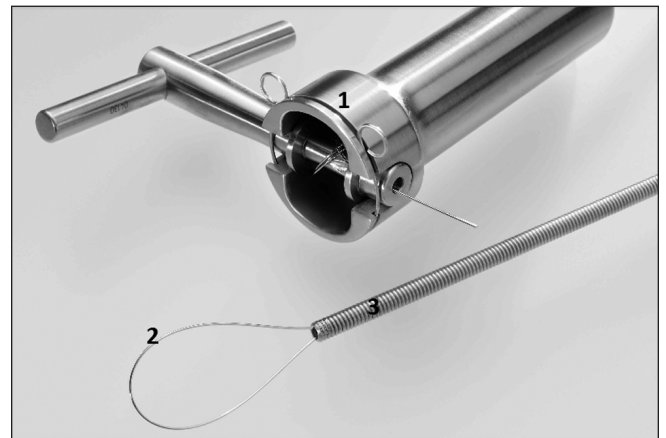


Fig. 3. Gastric Band Cutter. (1) Handgrip with a tourniquet. (2) Cutting wire and (3) metallic tube.

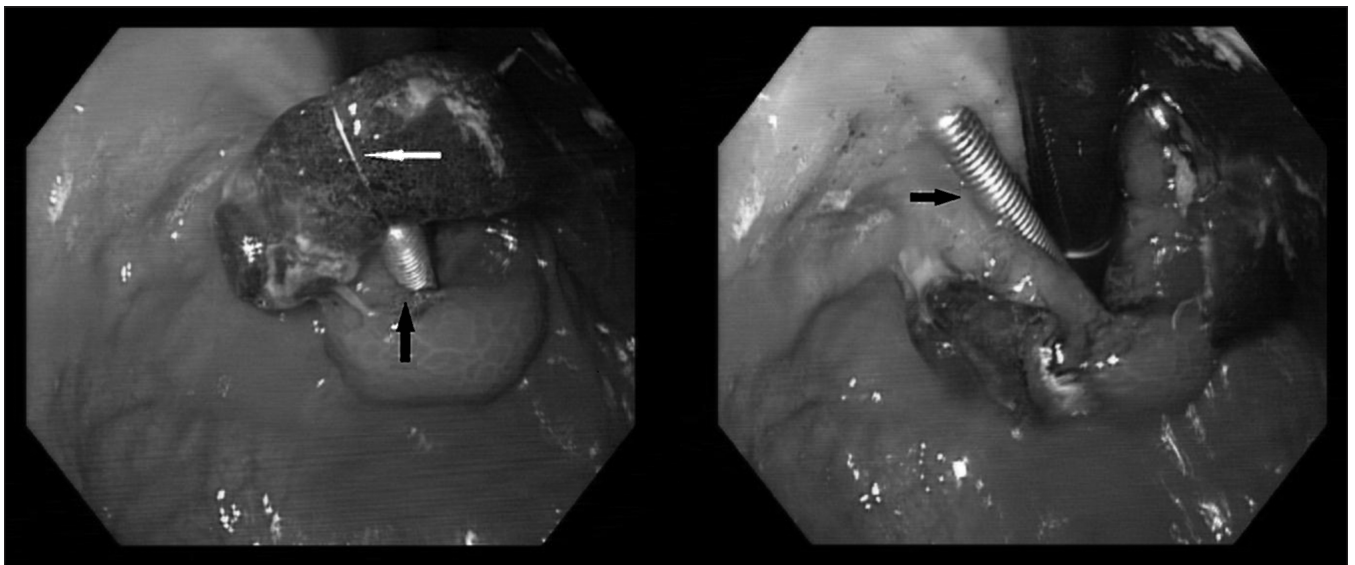


Fig. 4. Endoscopic view of the metallic tube (black arrows), cutting wire passed around the band (white arrow) and the intragastric cut band before extraction.

in the abdomen and that the connecting tube penetrated into the stomach at the level of the fundus.

DISCUSSION

Laparoscopic adjustable gastric banding is effective and safe, and good results are universally reported despite some complications.¹²⁻¹⁴ Band erosion is a long-term complication reported in several series.^{6,9,15} The presenting symptoms are nonspecific;⁷ in our patients, the most common symptoms were upper abdominal pain, port site infection and weight regain, which are in line with findings from other studies.¹⁶⁻¹⁸

According to the literature, band erosion after LAGB occurs in about 0.6%–11% of patients.^{4,5} In our study, 14 of 110 (12.7%) patients experienced band erosion and underwent gastroscopic or surgical removal of the band system. This rate of erosion is higher than that reported in previously published series. It is well known that there is a significant correlation between band erosion and surgeon experience. The annual risk of band erosion is much higher during the first 2 years of surgical practice than in subsequent years.¹⁶ Data from a systematic review of band erosion showed that the rate of erosion was as high as 17% in studies involving fewer than 100 patients and that the rate of erosion decreases over time.¹⁹ Therefore, it is possible

Table 1. Adjustable gastric band implantation: type of band, symptoms and follow-up

| Patient no. | Band type | Presenting symptoms | Pressure inflation | Time of diagnosis after surgery | Procedure and methods used to remove bands |
|-------------|-----------|---------------------|--------------------|---------------------------------|---|
| 1 | AMI Soft | Port site infection | 9 mL saline | 21 mo | Band removed with Gastric Band Cutter |
| 2 | MiniMizer | Port site infection | 3 mL saline | 24 mo | After being cut, the band was locked in the gastric wall and required removal by laparotomy |
| 3 | MiniMizer | Epigastric pain | 4 mL saline | 24 mo | Band removed with Gastric Band Cutter |
| 4 | MiniMizer | Port site infection | 3 mL saline | 18 mo | After being cut, the band was locked in the gastric wall and required removal by laparotomy |
| 5 | AMI Soft | Epigastric pain | 7 mL saline | 47 mo | Band removed with Gastric Band Cutter |
| 6 | AMI Soft | Dysphagia | 6.5 mL saline | 34 mo | Band removed with Gastric Band Cutter |
| 7 | AMI Soft | Weight regain | 8 mL saline | 24 mo | Band removed with Gastric Band Cutter |
| 8 | AMI Soft | Epigastric pain | 4 mL saline | 36 mo | Band removed with Gastric Band Cutter |
| 9 | AMI Soft | Weight regain | 4 mL saline | 27 mo | Band removed with Gastric Band Cutter |
| 10 | MiniMizer | Epigastric pain | 5 mL saline | 36 mo | Band removed with Gastric Band Cutter |
| 11 | MiniMizer | Weight regain | 4 mL saline | 40 mo | Twisting of the cutting wire required conversion from endoscopy to laparotomy |
| 12 | MiniMizer | Port site infection | 10 mL saline | 44 mo | Band removed with Gastric Band Cutter |
| 13 | AMI Soft | Weight regain | 10 mL saline | 30 mo | Tube removed surgically for penetration into the stomach |
| 14 | MiniMizer | Epigastric pain | 4 mL saline | 52 mo | Band removed with Gastric Band Cutter |

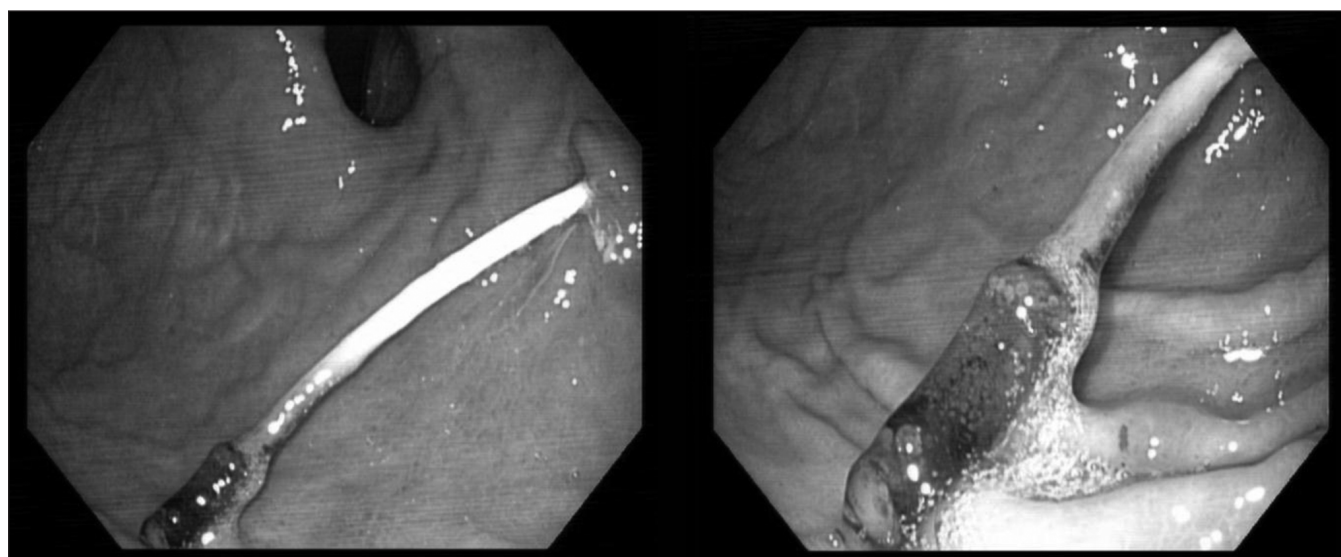


Fig. 5. Endoscopic views of intragastric migration of the connecting tube broken close to the gastric band.

that most of the patients with band erosions in our study underwent LAGB during the surgeon's learning phase.

The definite causes of band erosion have yet to be determined; much has been written about the causes and risk factors.²⁰ Reports suggest that unrecognized intraoperative injury,^{6,21} certain bands (e.g., the Vanguard)²⁰ and over-

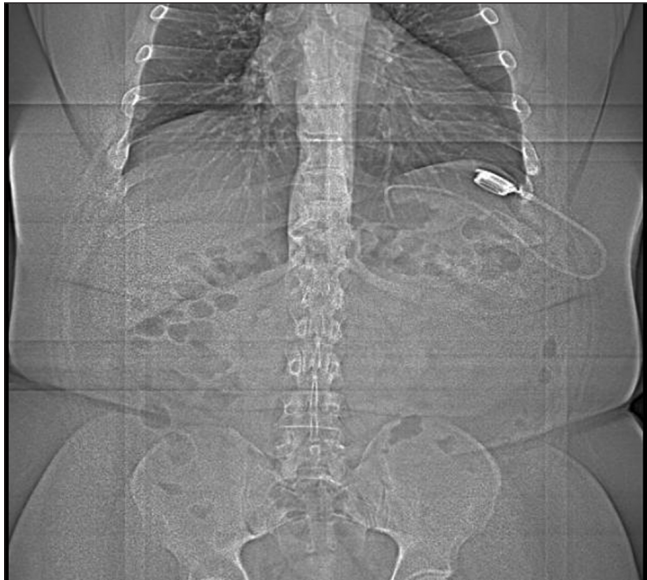


Fig. 6. Reconstruction image of the abdominal computed tomography scan showing intragastric penetration of the connection tube with no gastric band.



Fig. 7. Three-dimensional image of the abdominal computed tomography scan showing intragastric penetration of the connection tube with no gastric band.

filling of the band^{8,20} may predispose to erosion. In a study involving 454 patients, chronic overfilling of the band was defined as an increased filling volume of 10–12 mL.⁸ As such, overfilling may have explained the band erosion in some of our patients (no. 12 and 13). Also, port site infection has been reported to be the first symptom of erosion,²² as seen in some of our patients (Table 1). Although 1 study (23 pregnancies in a series of 359 patients) reported that pregnancy after adjustable gastric banding was not associated with severe complications,²³ band migration after pregnancy has occurred in other studies,^{24,25} and severe vomiting in early pregnancy has been hypothesized to be the cause of band migration.²⁵ Two of our patients (no. 6 and 9) had histories of pregnancy after the LAGB, but we do not know whether vomiting was the cause of migration in these women.

Although most bariatric surgeons agree that band erosion treatment includes removal of the affected band, no consensus exists among authors as to what would be the best method of removal. Some authors remove the band laparoscopically,^{26,27} whereas others prefer endoscopic retrieval.¹⁸ Some recent papers report a high success rate with an endoscopic approach for the removal of the migrated band.^{28,29} Neto and colleagues²⁸ reported that endoscopic removal is possible for 85% of patients in the first session with a complication rate of 5.8%. Another study reported that endoscopic removal was attempted in 50 of 63 patients with band erosion, with a 92% success rate and a 10% complication rate.²⁹ A symptomatic pneumoperitoneum was the main complication reported in both studies. In our series, we removed the band endoscopically in 13 of 14 patients, with 3 patients requiring conversion to laparotomy. Our success rate was 77% in the single session with no complications.

In 1 patient, the endoscopic approach was not possible. In that patient, the connecting tube had been broken close to the band and penetrated into the stomach. We couldn't find the gastric band with abdominal CT or laparoscopy. Only the port and catheter tubing could be surgically extracted. In the other 13 patients, we used the endoscopic approach, but we were able to complete the procedure in only 10 of the patients. We converted to laparotomy in 3 patients: in 1 patient (no. 11) because the cutting wire twisted in the esophagus and was blocked in the stomach and in 2 patients (no. 2 and 4) because of the firmly fixed bands by adhesions and sutures outside the stomach. All patients in whom the endoscopic procedure was unsuccessful, had MiniMizer Extra adjustable gastric bands.

CONCLUSION

Endoscopic removal of a migrated band with the Gastric Band Cutter appears to be an effective and safe method for managing band erosion. It allows early discharge of patients and avoids an operation. Our experience indicates

that if a patient had a MiniMizer band implanted, the presence of perigastric sutures and adhesions around the band can make it difficult to remove it endoscopically.

Competing interests: None declared.

Contributors: Ü.B. Dogan and C. Yilmaz designed the study. M.S. Akin, S. Yalaki and A. Akova acquired the data, which Ü.B. Dogan analyzed. Ü.B. Dogan and M.S. Akin wrote the article, which all authors reviewed and approved for publication.

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