Zapping Zenker's diverticulum: Gastrosopic treatment

Chris JJ Mulder MD PhD

CJJ Mulder. Zapping Zenker's diverticulum: Gastrosopic treatment. Can J Gastroenterol 1999;13(5):405-407. Zenker's diverticulum (ZD) is a common cause of dysphagia in the elderly. Many symptomatic elderly are poor candidates for surgery and/or ear, nose and throat treatment. The author's first experiences with gastrosopic treatment by cutting the Zenker bridge to allow an overflow have recently been published. Only patients with contraindications for general anesthesia were accepted to the pilot group. However, the author now treats all ZD patients in this manner. One hundred and twenty-five patients (male to female ratio 1.6) were referred for treatment from 1993 to 1997. After introduction of the gastroscope into the esophagus, a nasogastric tube was positioned to treat a ZD bridge with a height of less than 1 cm. The ZD bridge was divided by argon plasma coagulation, if necessary, in combination with monopolar forceps, Savary dilator and/or precut needle. All patients received antibiotics, topical anesthesia to the throat, if necessary, and intravenous midazolam, if possible. Radiography was performed after treatment. Normalization of the diet was allowed when the x-ray showed no signs of leakage. All patients referred for treatment were treated successfully. The median age was 77 years (range 41 to 100 years). Symptomatic improvement was seen in all patients after treatment. Complications included subcutaneous emphysema (n=17), mediastinal emphysema (n=5) and bleeding (n=2). One patient (95 years of age) died in her nursing home 27 days after treatment due to massive pulmonary embolism. The thirty-day mortality rate was otherwise zero. Three patients had been previously treated by surgeons and 12 by ear, nose and throat physicians, without sufficient improvement; all were adequately treated by the author. The mean number of treatment sessions was 1.8. This approach seems safe and effective. Treatment of every patient was possible and was carried out, even in patients in very poor condition, without general anesthesia.

Key Words: *Dysphagia; Endoscopy; Zenker's diverticulum*

La fin du diverticule de Zenker : Traitement gastrosopique

RÉSUMÉ : Le diverticule de Zenker (DZ) est une cause fréquente de dysphagie chez la personne âgée. Les gens âgés symptomatiques sont souvent de piètres candidats à la chirurgie ou au traitement oto-rhino-laryngologique. Les premières expériences de l'auteur avec le traitement gastrosopique en sectionnant le pont de Zenker pour permettre un débordement ont récemment été publiées. Seuls les patients chez qui l'anesthésie générale était contre-indiquée ont été acceptés dans le groupe pilote. Par contre, l'auteur traite maintenant de cette façon tous ses patients atteints de DZ. Cent vingt-cinq patients (hommes et femmes dans un rapport de un pour six) ont été adressés pour traitement (de 1993 à 1997). Après l'introduction du gastroscope dans l'oesophage sans l'aide d'un guide, un tube nasogastrique est positionné pour traiter un pont de DZ d'une hauteur de moins de 1 cm. Le pont de ZD est divisé par coagulation à l'argon, au besoin, en association avec des forceps monopolaires, le dilateur de Savary et (ou) un micro-bistouri de pré-coupe. Tous les patients ont reçu des antibiotiques, une anesthésie topique à la gorge au besoin et du midazolam par voie intraveineuse si possible. Une radiographie a été effectuée après le traitement. La normalisation de la diète a été permise lorsque la radiographie ne montrait aucun signe de fuite. Tous les patients adressés pour traitement ont été traités avec succès. L'âge moyen était de 77 ans (entre 41 et 100 ans). Tous les patients ont vu leur état s'améliorer après le traitement. Les complications ont été, entre autres, l'emphysème sous-cutané (n = 17), l'emphysème médiastinal (n = 5) et le saignement (n = 2). Une patiente (de 95 ans) est décédée à son centre d'hébergement 27 jours après le traitement en raison d'une embolie pulmonaire massive. La mortalité après 32 jours a par ailleurs été de zéro. Trois patients avaient déjà été traités par des chirurgiens et 12 par des oto-rhino-laryngologistes, sans amélioration satisfaisante. Ils ont tous été traités avec succès par l'auteur. Le nombre moyen de séances de traitement a été de 1.8. Cette approche semble sûre et efficace. Le traitement de chaque patient a été possible et effectué, même chez ceux dont l'état était plus ou moins satisfaisant, sans anesthésie générale.

Zenker's diverticula (ZD) arise from a relative dehiscence between the inferior margin of the inferior pharyngeal constrictor and the cricopharyngeus, an area known as Killian's hiatus (1,2). ZD are pulsion diverticula, thought to be related to dysfunction of the cricopharyngeal sphincter, and

are pseudodiverticula in that they consist only of mucosa. They are two to three times more common in men and usually occur on the left side of the neck (3). Clinically, they can produce dysphagia, aspiration or regurgitation of food, pneumonia and weight loss.

Department of Hepatogastroenterology, Rijnstate Hospital, Arnhem, The Netherlands

Correspondence and reprints: Dr Chris JJ Mulder, Department of Gastroenterology, Rijnstate Hospital, POB 9555, 6800 TA Arnhem, The Netherlands. Fax 00 31 26 3786737, e-mail cjmulder@rijnstate.nl

Figure 1) After positioning a nasogastric tube (NGT), the Zenker's diverticulum (ZD) becomes more pronounced

Radiographic findings of ZD are best viewed with a barium swallow. The normal esophagus is mostly seen anterior to the posterolateral diverticulum. During routine gastro-duodenoscopy, a ZD may be considered when it is impossible to endoscope further than the upper esophageal sphincter. The procedure should be terminated and a barium swallow should be used to assess the anatomy.

ZD is a relatively common cause of pharyngeal dysphagia in the elderly. Traditional treatment is surgery (4). In most hospitals, the treatment of symptomatic ZD is surgically orientated towards correcting the motor abnormality that produces its formation (myotomy), but in diverticula longer than 3 cm in diameter, the treatment of choice is resection (diverticulectomy). A cricopharyngeal myotomy is essential to prevent recurrence and is usually sufficient treatment by itself for smaller diverticula.

An endoscopic approach to the ZD was suggested near the turn of the 20th century. Large series were reported by Dohlman and Mattson (5). van Overbeek et al (6) perfected this technique using electrocoagulation and, since the early 1980s, a carbon dioxide laser. However, many symptomatic elderly are poor candidates for surgery and/or ear, nose and throat (ENT) treatment.

In 1995, Mulder et al (7) and Ishioka et al (8) reported in two different papers their first results with gastroscopic treatment by cutting the bridge between the ZD and the esophageal wall. With this technique, the bridge between the esophagus and the ZD is divided to allow an overflow from the ZD to the esophagus. Recently, Wahab et al (9) published their experiences with cutting the Zenker bridge with the use of argon plasma coagulation (APC) (9). The present article describes the results of the approach used in the first 125 patients comprising the study.

TECHNIQUE

After careful introduction of the gastroscope – if available, a partial side-viewing endoscope, eg, K-type (Olympus, Tokyo, Japan) – a nasogastric tube is positioned under direct vision into the esophagus with the help of a flexible guidewire. Sometimes, a flexible guidewire is necessary to intubate the esophagus. By positioning a nasogastric tube (16 French), the tissue bridge between the esophagus and ZD becomes more pronounced (Figure 1). The depth of the diverticulum is measured endoscopically or on barium swallow. The objective of the treatment is to achieve an asymptomatic state and a ZD bridge with a height of less than 1 cm. During endoscopy, a forward-viewing endoscope or a partial side-viewing endoscope, if necessary, is positioned just above the tissue bridge of the ZD. Recently, double lumen endoscopes have been introduced to the ZD treatment with guidewires in one channel and coagulation equipment in the other channel. However, in the majority of patients, the nasogastric tube is used as a guide, and the ZD bridge is divided in the midline by APC. Sometimes monopolar biopsy forceps coagulation (Valley Lab I B cut/coag 50/30 W, Boulder, Colorado; Erbe 200 ICC cut/coag endocut 60/30 W, Tubinger, Germany) helps.

After treatment, the ZD bridge is cleaved, if still necessary after APC treatment, by pulling the closed forceps back into the scope. By doing this the ZD bridge is divided piece by piece. Sometimes Savary dilators and/or pre-cut needles are necessary to open the last part of the ZD bridge.

All patients receive prophylactic intravenous antibiotics and amoxycillin (1 g) in combination with clavulanic acid (100 mg) for 24 h. Patients are fed with a nasogastric tube and given clear fluid orally (maximum 30 cm³/h) between procedures. The nasogastric tube is left in place for at least 2 h after the procedure. Radiography is performed 2 to 4 h after the last endoscopic treatment during hospitalization. Normalization of diet is allowed when the control x-rays show no signs of leakage.

PATIENTS

The investigation and its potential risks, such as perforation and subcutaneous emphysema, are carefully explained to the patient. Oral informed consent is required. A recent barium swallow is desirable. Preferably, the procedure is carried out in the morning after an overnight fast. If stasis of food in the ZD is suspected, the patient should stick to a liquid diet for one or two days before the investigation. Venous access must be available during the procedure. The pharynx is anesthetized with 10% lidocaine spray (Astra, Sotenborg, Sweden). All patients receive intravenous sedation, if possible, with midazolam (0.1 to 0.2 mg/kg, Roche, Basel, Switzerland).

One hundred and twenty-five patients, 76 males and 49 females, with a ZD were referred for treatment between January 1, 1993 and January 10, 1997. All patients had dysphagia. Only patients in poor condition with severe contraindications for general anesthesia were accepted to the pilot group (1993 to 1994). After this period, patients without

contraindications for surgery or ENT treatment were also included.

RESULTS

All 125 patients referred for treatment were treated successfully. The median age was 77 years (range 41 to 100 years). In all patients, symptomatic improvement was seen after one or two treatments. The patients were treated according to the normal, routine program for 20 to 30 mins. The average number of treatment sessions was 1.8, with a minimum of one and a maximum of 12 sessions. The smallest monopolar forceps and the K10-fiberendoscope were used preferentially in the first 20 patients. Since then, APC and Olympus-video K200 and/or Fujinon-video 300 (Fujinon, Tokyo, Japan) endoscopes have been used preferentially with or without monopolar forceps. The depth of the ZD varied from 2 to 12 cm, with a mean of 4.5 cm. Treatment of the patient with the large 12 cm diverticulum took 12 procedures, but his symptoms largely disappeared after the third procedure. However, the depth of the ZD was, at that time, still 9 cm. Repeat treatment was always possible. The wound edges of the bridge separate immediately after APC/monopolar forceps treatment. The excision is usually wedge-shaped. In ZDs with a depth of 4 to 5 cm or more, the edges in the lower part of the ZD separate more slowly. Cleaving the bridge with APC seems easier than with the forceps and was used preferentially on patients starting from patient 21. Sometimes it was necessary to remove coagulated material with standard forceps to obtain a better overview.

The interval between the endoscopies was one day. The maximum number of treatment sessions during one hospitalization was four, and was for one of the patients in the pilot-study group.

Complications included subcutaneous emphysema (n=17), mediastinal emphysema (n=5) and bleeding (n=2). The majority of patients (70% to 90%) had a sore throat for a few days after the treatment. One patient (95 years of age) died in her nursing home 27 days after treatment due to massive pulmonary embolism. The thirty-day mortality rate was otherwise zero. Three patients had been treated before by surgeons and 12 by ENT physicians without sufficient improvement; all were adequately treated by the author. Sometimes a pre-cut-needle (endoscopic retrograde cholangiopancreatography) was of benefit to cut the last part of the bridge.

CONCLUSIONS

With the use of a gastroscope, the approach described was possible in all patients referred for treatment of their ZD. Therapeutic endoscopic procedures of ZD and upper esophageal sphincter abnormalities are an extension of the gastroenterology field. This area is a new challenge for the future. For instance, about 15% to 20% of the author's ZD group have Barrett's esophagus. Abnormalities in swallow events are probably not only related to the central nervous system, but might also be related to reflux disease. Manometric studies of such abnormalities are required before and after

ZD treatment. A comprehensive approach to the study of the swallowing mechanism has been published recently (10).

In the literature, there is no adequate follow-up of the surgical and/or ENT ZD approaches. About 10% of the author's patients had been treated before by surgeons and ENT physicians, without sufficient improvement. The question is whether this was due to a residual or a recurrent ZD bridge. Future studies of endoscopy will clarify the cumulative risk of recurrent complaints after treatment. Sixty-seven patients (54%) have been seen for follow-up endoscopy. In all of them, a residual bridge 2 to 15 mm was diagnosed. All were treated again with APC and/or pre-cut needle. The majority had no difficulty swallowing solid food; however mucus and sputum were a problem for a subgroup. Acetylcysteine was of benefit for most of them. APC is especially suited for the devitalization of the ZD bridge. A laser approach seems to be inappropriate. Placing the flexible endoscope and laser in an optimal position towards the bridge with a gastroscope might be much more complicated than doing this with a rigid scope. By using a gastroscope, this technique should be possible in every interventional gastroenterology unit. It is suggested that this treatment be performed only in a few, selected hospitals (referral centres) to increase knowledge about it and its limitations, and to increase follow-up. The mean number of treatment sessions required to reduce sufficiently the height of the ZD bridge has been influenced by the learning curve of the author's team. The poor general condition of the treatment group has influenced the mean number of treatment sessions. However, experienced ENT physicians prefer to divide the ZD bridge into two or three sessions (3). With this technique, the same results as with the rigid ENT method are probably achieved. Therefore, the same long term effects are expected. Follow-up studies are mandatory.

REFERENCES

1. Zenker FA, von Ziemssen H. Dilatations of the esophagus. In: Cyclopaedia of the Practice of Medicine, vol 3. London: Low, Marston, Searle & Rivington, 1878:46-68.
2. Cook IJ, Gabb M, Panagopoulos V, et al. Pharyngeal (Zenker's) diverticulum is a disorder of upper esophageal sphincter opening. *Gastroenterology* 1992;103:1229-35.
3. van Overbeek JJM. Meditation on the pathogenesis of hypopharyngeal (Zenker's) diverticulum and a report of endoscopic treatment in 545 patients. *Ann Otol Rhinol Laryngol* 1994;103:178-85.
4. Watemberg S, Landau O, Avrahami R. Zenker's diverticulum: reappraisal. *Am J Gastroenterology* 1996;91:1494-8.
5. Dohlman G, Mattson O. The endoscopic operation for hypopharyngeal diverticula. *Arch Otolaryngol* 1960;71:744-52.
6. van Overbeek JJM, Hoeksema PE, Edens ETH. Microendoscopic surgery of the hypopharyngeal diverticulum using electrocoagulation or carbon dioxide laser. *Ann Otol Rhinol Laryngol* 1984;93:34-6.
7. Mulder CJJ, den Hartog G, Robijn RJ, Thies JE. Flexible endoscopic treatment of Zenker's diverticulum: a new approach. *Endoscopy* 1995;27:438-42.
8. Ishioka S, Sakai P, Maluf Filho F, Melo JM. Endoscopic incision of Zenker's diverticulum: a new approach. *Endoscopy* 1995;27:438-42.
9. Wahab PJ, Mulder CJJ, den Hartog G, Thies JE. Argon plasma coagulation in flexible gastrointestinal endoscopy: pilot experiences. *Endoscopy* 1997;29:176-81.
10. Shaw DW, Cook IJ, Jamieson GG, Gabb M, Simula ME, Dent J. Influence of surgery on deglutitive upper esophageal sphincter mechanics in Zenker's diverticulum. *Gut* 1996;38:806-11.