Endoscopic Mucosal Resection of Mucosal Neoplasm Located on the Duodenal Bulb through Endoscope Retroflexion

OBJECTIVE To assess the results of endoscopic mucosal resection (EMR) of benign mucosal neoplasms located on the duodenal bulb using endoscope retroflexion.

METHODS This study involved 14 patients with 16 mucosal neoplasms located on the duodenal bulb. The diameter of each neoplasm was less than 15 mm. After endoscope retroflexion within the duodenum for evaluation of the size, extent and depth of the tumor, EMR was attempted with endoscope retroflexion for removing the lesion in the duodenal bulb. The rate of endoscope retroflexion, the time required for endoscope retroflexion, median operation time, curative resection rate, en bloc resection rate, complication, and median follow-up period were evaluated.

RESULTS Sixteen lesions in 14 patients (median age of 56 years, 5 female, 9 male) were removed through EMR. The mean size of the lesions resected was 6.9 mm (median size of 5.5 mm, range of 3-15 mm). Post-EMR histologic examination revealed Brunner’s gland hyperplasia in 6, gastric mucosal metaplasia in 5, adenoma in 1, chronic inflammation in 3, and benign lymphocytic hyperplasia in 1. The curative resection rate was 100% (16/16), and the en bloc resection rate was 94% (15/16), with EMR. One of the lesions was piecemeal removed through EMR for its large size (15 mm) and for its involving the area from the duodenal bulb to the pyloric ring. The success rate of endoscope retroflexion within the duodenum was 94% (15/16). The time required for endoscope retroflexion was longer for the first 10 lesions (median time of 2 min, range of 1.5 min) than that for the last 5 lesions (median time of 1.5 min, range of 1-2 min). The median follow-up period was 22 months (range of 4-48 months). During the follow-up, no residual, no pyloric or duodenal stenosis was found in any of the patients after EMR. There was no severe hemorrhage, or perforations occurring.

CONCLUSION EMR of mucosal neoplasm located on the duodenal bulb through endoscope retroflexion, which is a feasible and useful adjunctive procedure, appears to be a safe and effective technique.

KEY WORDS: endoscopic mucosal resection, mucosal neoplasm, duodenal bulb, endoscope retroflexion.

Introduction

Sporadic mucosal neoplasms located on the duodenal bulb are not very common. The optimal treatment method has not yet been de-
Endoscopic resection of such lesions has traditionally been considered high risk because of the thin duodenal wall[1]. EMR of a duodenal lesion was first described in 1992, but since then there have been few reports of endoscopic resection in the duodenum[2-4]. EMR is difficult to perform in patients who have mucosal neoplasms located on the duodenal bulb, especially for lesions that extend from the duodenal bulb to the pyloric ring, or lesions not well visualized by the conventional forward viewing method.

The first description about the use of endoscope retroflexion in the duodenal bulb for the diagnosis and treatment of neoplasm was reported in 2002[5]. Endoscope retroflexion has been generally used safely in the stomach, rectum or colon and is a useful adjunctive procedure for the diagnosis and treatment of gastrointestinal lesions[6,7]. However, perforations are realized to be associated with the use of this procedure[8]. So far, a few case reports have described endoscopic resection of neoplasms located on the pyloric ring, which have invaded the duodenal bulb[9,10]. Endoscopic resection by EMR with an endoscope retroflexion in the duodenal bulb, has not been standardized as lack of data on long-term outcomes. The aim of this study was to assess the safety and effectiveness of EMR removing benign mucosal neoplasms located on the duodenal bulb through endoscope retroflexion.

**Patients and Methods**

Fourteen patients with 16 lesions diagnosed as Brunner’s gland hyperplasia (n = 6), gastric mucosal metaplasia (n = 5), adenoma (n = 1), chronic inflammation (n = 3), benign lymphocytic hyperplasia (n = 1) and treated in Department of Endoscopy of Tianjin Medical University Cancer Hospital and Institute between May 2006 and May 2010 were included in this retrospective study. The local ethics committee approved the study protocol, and informed consent was obtained from all the patients. Sixteen benign neoplasms were located on the duodenal bulb, 4 of which extended from duodenal bulb to the pyloric ring.

EMR procedure was performed on the 16 patients by an experienced endoscopist in our hospital. Patients were given Propofol and Fentanyl intravenously for anesthesia. A single-channel endoscope (Olympus Q260; Olympus Optical, Tokyo, Japan) was used in EMR. In all the cases, only 1 or 2 edge of the lesions of duodenal bulb was apparent in conventional Forward endoscopic view (Fig.1). Retroflexion was used to evaluate the full view of neoplasm in the duodenum, especially ranging from the duodenal bulb to the pyloric area (Fig.2). The evaluation of the duodenum through retroflexion during esophagogastroduodenoscopy was performed with a maneuver similar to that used in rectal retroflexion during colonoscopy[7,11,12]. The instrument tip was advanced beyond the pyloric ring and deflected maximally in the superior direction while the instrument was torqued. Then, the instrument was pulled out slightly until the lesion was seen in the field of view. Subsequently, en bloc resection was performed[13-15]. Saline solution with 0.01% epinephrine was used as submucosal injection solution (Fig.3), and then snare resection was followed (Fig.4). Sometimes, EMR with a cap-fitted method or with circumferential precut-

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**Fig.1.** Conventional Forward endoscopic view of duodenal bulb neoplasm revealing one edge of lesion.
**Fig.2.** Retroflexed endoscopic view of mucosal neoplasm located on the duodenal bulb which extends to the pyloric ring.
**Fig.3.** Retroflexed endoscopic view of submucosal injection with saline solution with 0.01% epinephrine.
**Fig.4.** Retroflexed endoscopic view of wound surface post-EMR.
**Fig.5.** Retroflexed endoscopic view of closed wound surface by endoclip.
**Fig.6.** Forward view of healed wound surface 40 days later.
ting was attempted. The wound surface left by removing the lesion was closed with endoclip (Fig. 5). Criteria for curative resection were en bloc resection or complete resection piecemeal, no left neoplasm in the resected margin. The curative resection rate, en bloc resection rate, median time of the surgery, complications caused by the surgery were assessed. Resected specimens were observed by 2 experienced pathologists.

Results

The success rate of retroflexion within the duodenum was 94% (15/16). Four neoplasms (1 adenoma and 3 chronic inflammation polyps) extended from the duodenal bulb to the pyloric area. EMR or EPMR was attempted in all the patients (Table 1). The curative resection rate was 100% (16/16), and the en bloc resection rate was 88% (14/16). One case underwent EPMR for the large size of the neoplasm, and another was underwent thermocoagulation for the failure of retroflexion during the EMR. The median size of the resected specimens was 5.5 mm (ranging from 3 mm to 15 mm). The success rate of endoscope retroflexion was 94% (15/16). The reason of the failure of retroflexion was duodenal ulcer scar, which is one of the contraindications[10]. The median time of the surgery was 35 min (range of 20-60 min), and the time spent for endoscope retrofitexion in the first 10 cases was longer (median time 2 min, range of 1-2.5 min) than that for the last 4 cases (median time 1.5 min, range of 1-2 min). The median follow-up period of all the patients was 22 months (range 4-48 months). Major complications caused by the resection, such as obvious perforation or serious bleeding that required transfusion, were not presented. Bleeding during the resection was not common in the patients, and it was managed with hemostatic forceps or hemoclips for the cases who had bleeding during the resection. There was no patient having recurrence or developing pyloric or duodenal stenosis after EMR (Fig. 6).

Discussion

Endoscope retroflexion is a usual maneuver performed in the endoscopic evaluation of the stomach, duodenum, anorectum and colon[10,16-18]. Some duodenal bulb lesions, which can not be observed clearly with the conventional forward viewing method, are revealed and removed by retroflexion. Endoscope retroflexion can not only improve neoplasms detection due to good visual fields, but also help to remove some neoplasms in gastrointestinal tract, which are difficult to be resected using forward viewing endoscope. Technically, retroflexion is not very difficult to perform in the duodenal bulb. However, some patients couldn’t stand the abdominal pain when the procedure of retroflexion was performed, therefore, in our department Propofol and Fentanyl were used for painless esophagogastroduodenoscopy when retroflexion the endoscope. Generally speaking, it has been safely used in the detection and resection of the tumor located in gastrointestinal tract, but some cases have been reported to have a risk of perforation induced by the use of the retroflexion procedure[8,19,20]. Therefore, retroflexion maneuver are not performed on the patients

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Table 1. characterization of cases and treatment results.

<table>
<thead>
<tr>
<th>Case</th>
<th>Patient’s age (years)/sex</th>
<th>Concomitant disease</th>
<th>Neoplasms size (mm)/quantity</th>
<th>Yamada classification</th>
<th>Location of lesion</th>
<th>Pathology</th>
<th>Endoscopy retrofitexion</th>
<th>En bloc resection/ (cause of failure)</th>
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<td>9/1</td>
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F, female; M, male; HT, hypertension; DM, diabetes mellitus; DU, duodenal ulcer scar; AW, anterior wall; PW, posterior wall; LC, lesser curvature; GC, greater curvature; BGH, brunner gland hyperplasia; GMM, gastric mucosal metaplasia; CI, chronic inflammation; BLH, benign lymphoctic hyperplasia; AD, adenoma.
with chronic peptic ulcer disease or severe duodenal scarring\(^5,^{10}\). Retroflexion, which can observe circumferentially duodenal bulb and juxtapyloric region, is valuable in assessing the size, depth and extent of tumor and in removing the tumor. So far, duodenal bulb lesions have been successfully removed by the endoscope retroflexion\(^5,^{20}\).

Retroflexion during duodenal bulb examination is not universally performed, although studies from overseas have shown that it detects more lesions and treats more thoroughly than forward viewing alone. We are the first one in China reporting that the 14 cases with 16 lesions were performed retroflexion on the duodenum bulb and 15 of 16 lesions (94\%) in the duodenal bulb were evaluated using the retroflexion. We had a case that had a duodenal ulcer scar, not performed retroflexion for the reason of worry about the perforation induced by retroflexion. Further studies are needed in whether endoscope retroflexion in the duodenal bulb is performed as a rule.

Technically, EMR is not difficult to perform if the lesion is well visualized, and if not, retroflexion can help to acquire clear view. Generally speaking, EMR of benign mucosal neoplasms located on duodenal bulb is somewhat difficult to perform, because it is easy to perforate, and also easy to bleed or develop duodenal stenosis, especially for neoplasms that extend to the pyloric ring. In our study, lesions were all less than 20 mm in diameter, so EMR were performed according to the literature from overseas\(^21-24\). EMR was performed on 14 lesions, EPMR on 1 lesion, and thermocoagulation on another lesion. Four lesions (1 adenoma, 2 chronic inflammation, 1 Brunner’s gland hyperplasia) were extended from the duodenal bulb to the pyloric area. EMR was considered difficult to perform on the case (size of 15 mm in diameter), so EPMR was performed. Considering the risk of perforation and the small duodenal bulb lesions, we didn’t take ESD as our first choice. However, ESD is a proper way, especially to the lesions, of diameter is larger than 20 mm\(^10\).

Coda et al.\(^{25}\) reported that 7\% (8 of 115) of patients developed pyloric stenosis, and an extent of the mucosal defect of greater than 3/4 of the total pyloric ring circumference was a significant risk factor for occurrence of post-ESD stenosis in pyloric resection. However, in our study, none of the patients experienced severe hemorrhage, perforation, recurrence, pyloric or duodenal stenosis after EMR. No obvious complications occurred probably because the lesions were all in small size, located in superficial layer and extended to local area. Considering the risk-benefit ratio, endoscope retroflexion, it should be recommended for use during esophago-gastroduodenoscopy.

In conclusion, endoscope retroflexion is a feasible and useful adjunctive procedure for the diagnosis and treatment of duodenal bulb neoplasms. Furthermore, EMR with retroflexion within the duodenum is supposed to be a safe and effective way in removing benign neoplasmas (less than 20 mm) located on the duodenal bulb.

Conflict of interest statement

No potential conflicts of interest were disclosed.

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