

CASE REPORT

Dieulafoy's lesion of the duodenum: a comparative review of 37 cases

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SUMMARY

Dieulafoy's lesion is an abnormally large, tortuous, submucosal vessel that erodes the overlying epithelium without primary ulceration or erosion. The lesion predominantly occurs in the proximal stomach but it is also reported in extragastric sites. The pathogenesis and precipitating factors are poorly understood. Patients frequently present with gastrointestinal haemorrhage that can range from being self-limited to massive life threatening. Although there are no standard guidelines, endoscopy has significantly impacted the diagnosis and management. This review outlines our current understanding of the epidemiology of and risk factors for Dieulafoy's lesion of the duodenum, the pathophysiology of this disorder, and currently available approaches to diagnosis and management.

BACKGROUND

Dieulafoy's lesion was first reported in 1884 by Dr M T Gallard. However, this unusual disease was properly distinguished and described by the French surgeon, Paul Georges Dieulafoy (1839–1911). He presented unique superficial gastric ulcers with large, submucosal arterioles in the stomach of three patients. The lesions lacked typical features of a gastric ulcer, and he designated them as 'exulceratio simplex'. Subsequently, it was named as Dieulafoy's lesion following the publication of his work in 1898.¹ This aetiology is relatively rare but an important cause of gastrointestinal haemorrhage.² Endoscopy is the key diagnostic tool.

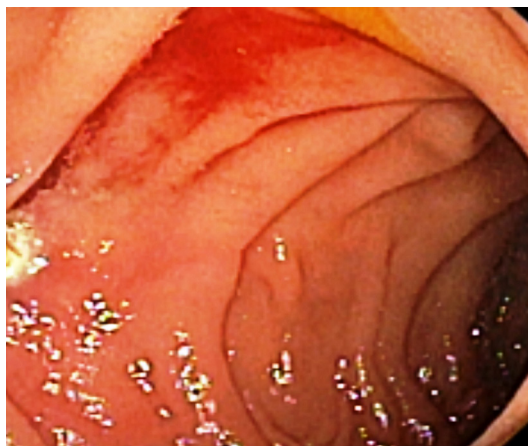


Figure 1 Oesophagogastroduodenoscopy revealing a vessel protruding into the lumen of the second portion of duodenum surrounded by active oozing of blood.

In patients where endoscopy fails to identify the lesion, contrast-enhanced CT, angiography and/or surgical interventions are commonly employed.³ Before endoscopy, the management of patients with Dieulafoy's lesion was a predicament and mortality rate ranged from 23% to 79%.⁴ Recently, endoscopic therapeutic interventions have revolutionised the management. Endoscopic tattooing can be helpful to locate the lesion for further endoscopic retreatment.⁴ Surgery is reserved mainly for patients with rebleeding after failed endoscopic therapies.⁵

Dieulafoy's lesion of the duodenum is relatively uncommon constituting 15% of all the cases. The data largely consist of case reports and case series. Due to rarity of the disease and masquerading nature of the lesion, the patients with Dieulafoy's lesion frequently pose a diagnostic and therapeutic challenge.^{6–9} In this article, we review the pertinent medical literature for duodenal Dieulafoy's lesion and update clinicians regarding the advancements in diagnosis and treatment.

CASE PRESENTATION

A 78-year-old woman presented to the emergency department with black, tarry stools at a frequency of one episode per day for the last 4 days. She had a history of spinal stenosis, arthritis, chronic kidney disease stage 3b, atrial flutter with intermittent supraventricular tachycardia and mitral valve replacement (mechanical bileaflet, on warfarin therapy). The patient denied haematemesis, bleeding gums, abdominal pain, chest pain, difficulty breathing, nausea, vomiting, light headedness, skin conditions or recent trauma.

INVESTIGATIONS

Physical and abdominal examinations were unremarkable. Laboratory parameters revealed haemoglobin 7.4 g/dL (normal, 12.0–15.5 g/dL), which dropped from 10.2 g/dL in the last 8 months. Her international normalised ratio (INR) was 7.8 (normal, 2.0–3.0). Echocardiography was performed for cardiac clearance that showed left ventricular ejection fraction of 55% without any valvular abnormality. After normalisation of the INR, the patient underwent an oesophagogastroduodenoscopy. It showed active bleeding from a blood vessel in the second portion of the duodenum without an evidence of surrounding ulceration or erosion (figure 1). Colonoscopy was performed 8 months ago, which was negative for bleeding.



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Figure 2 Endoscopic procedure for haemoclip application; two haemoclips were securely applied to the base of the bleeding vessel.

DIFFERENTIAL DIAGNOSIS

The differential diagnoses included peptic ulcer disease, variceal bleeding secondary to portal hypertension, coagulation abnormalities, arteriovenous malformations, vascular aneurysms and cancer. However, extensive diagnostic work-up and endoscopic findings excluded all these probable causes in our patient.

TREATMENT

On admission, her warfarin therapy was discontinued and intravenous esomeprazole was started. She was transfused 2 units of packed red blood cells, 2 units of fresh frozen plasma and 10 mg of vitamin K. Based on consistent endoscopic findings, she was diagnosed with the Dieulafoy's lesion of the duodenum. Primary haemostasis was achieved with argon plasma coagulation followed by endoscopic application of two haemoclips (HX-610-090L; Olympus Medical Systems, Waltham, Massachusetts, USA) (figure 2). She tolerated the procedure well and there was no immediate rebleeding.

OUTCOME AND FOLLOW-UP

The clinical course was uneventful and she was discharged from the hospital in stable condition. At the 1-month follow-up, she was asymptomatic and did not experience an episode of gastrointestinal bleeding. The patient continues to do well without recurrence of the disease to date.

DISCUSSION

Dieulafoy's lesion is a relatively rare clinicopathological entity. The most common location for this lesion is the lesser curvature of the stomach within 6 cm of the gastro-oesophageal junction.¹⁻³ However, reports involving other gastrointestinal locations are also available.⁴⁻⁹ In 1988, McClave *et al* first identified duodenal Dieulafoy's lesion and reported this aetiology in four patients.¹⁰ Since then, many cases have been documented worldwide. We conducted an extensive literature search of the medical databases, MEDLINE and PubMed (National Library of Medicine, Bethesda, Maryland, USA) using a combination of terms, including 'Dieulafoy's lesion', 'haemorrhage', 'bleeding' and 'duodenum'. After carefully reviewing the relevant literature consisting of but not limited to original articles, case series

and case reports, a total of 37 cases of Dieulafoy's lesion of the duodenum were found retrievable. A comprehensive review of these previously reported cases showed that there was no clear gender predominance (male, n=22; female, n=15). The mean age of patients was 56 years (range, 03-91 years).¹⁰⁻³⁵ The data of patients with duodenal Dieulafoy's disease regarding the epidemiology, clinical features, comorbid conditions, diagnosis and management are summarised (table 1).

The clinical presentation in patients with Dieulafoy's lesion of the duodenum was dominated by melena and haematemesis. Combined melena and haematemesis, haematochezia, hypotension, syncope and iron-deficiency anaemia were other notable presenting symptoms. Few patients were admitted to hospital for causes other than gastrointestinal bleeding and the diagnosis of Dieulafoy's lesion was made on incidental endoscopy. The bleeding episodes in numerous cases were mild and self-limiting. However, a vast majority of patients were identified with an intermittent and massive gastrointestinal haemorrhage leading to haemodynamic compromise. While haemodynamic status plays a key role in reaching an accurate diagnosis, it also carries paramount importance to decide about the appropriate treatment. Hence, the initial clinical presentation in patients with Dieulafoy's lesion largely depends on the duration of bleeding, the general condition of the patient, localisation of bleeding and diameter of the bleeding vessel.

The pathogenesis of Dieulafoy's lesion remains unknown. It has previously been hypothesised that calibre-persistent submucosal arteries with relatively large diameter may cause ischaemia of overlying mucosa due to pulsatility. This process leads to thinning of mucosal wall, exposing the artery to the gastrointestinal contents. Due to this abnormal exposure, even minor mechanical trauma from a food bolus erodes this artery resulting in severe acute gastrointestinal haemorrhage without ulceration.^{36,37} It is further notable that these arteries typically lack aneurysmal, arteriosclerotic or vasculitic changes.³⁸ Few studies correlated gastric lesions with non-steroidal anti-inflammatory drugs, aspirin and/or warfarin therapy possibly by causing mucosal atrophy and ischaemic injury.³⁹ Comorbid conditions, such as alcohol consumption, drug abuse, advanced liver disease, autoimmune disorders, cardiopulmonary conditions, diabetes mellitus, hyperlipidaemia, concomitant peptic ulcer disease and renal failure have been implicated as predisposing factors for bleeding in patients with the Dieulafoy's lesion.³⁹ Congenital abnormalities, senile atrophy and tumour growth may also add to the pathogenesis.³⁹ In the current study, hypertension and/or diabetes mellitus were relatively less frequently encountered in patients with the duodenal disease in comparison to the Dieulafoy's lesion from other gastrointestinal locations.

Dieulafoy's lesion may present a significant diagnostic challenge as the lesions are very small causing obscured, intermittent gastrointestinal bleeding with normal surrounding mucosa.³⁹ The absence of surrounding mucosal ulceration or erosion is an important factor that has frequently been validated and considered as the characteristic feature of Dieulafoy's lesion.³⁹ Before 1990, surgery and postmortem examination were the major diagnostic modalities. However, endoscopy is the preferred initial investigation in current practice.⁴⁰ Endoscopic criteria have been devised for the diagnosis of Dieulafoy's lesion, including: (1) the identification of arterial spurting or micropulsatile bleeding from a small (<3 mm) mucosal defect with the normal surrounding mucosa; (2) visualisation of a protruding vessel with or without active bleeding surrounded by normal mucosa and/or (3) fresh, densely adherent clots with a small point of attachment to the mucosal defect or to normal-appearing mucosa. These criteria play a significant diagnostic role in

Table 1 Literature review of Dieulafoy's lesion of the duodenum

Author, year	Country	Age/Gender	Clinical presentation	Comorbidity	Endoscopy findings	Treatment	Outcome
McClave <i>et al.</i> ¹⁰ 1988	USA	16/M	Haematemesis	None	Normal endoscopy. Laparotomy revealed a very small red spot at the superior duodenal angle	A 'figure-of-eight' suture placement	Recovered
McClave <i>et al.</i> ¹⁰ 1988	USA	61/M	Melena, BRBPR, orthostatic dizziness, haematemesis	None	Normal endoscopy. A small clot adherent to the duodenum on laparotomy	The lesion was oversewn and a truncal vagotomy with pyloroplasty was performed	Recovered
McClave <i>et al.</i> ¹⁰ 1988	USA	42/M	Recurrent, massive upper GI haemorrhage	None	Normal endoscopy. A spurting artery in C-loop of the duodenum with normal surrounding mucosa on laparotomy	Suture plication of the lesion	Recovered
McClave <i>et al.</i> ¹⁰ 1988	USA	62/M	Maroon-coloured stools, diarrhoea, BRBPR	Alcohol abuse	An arterial jet of bright red blood emanating from a very small, thickened, 1 cm long artery at the superior duodenal angle	Surgical excision	Recovered
Perez Machado and Arcos de Gonzalez, ¹¹ 1990	Turkey	74/M	Melena	DM, HTN, IHD	Pulsatile vessel in duodenal bulb	APC and 1/10 000 epinephrine sclerotherapy	Recovered
Choudhari and Palmer, ¹² 1993	UK	55/F	Melena	AF, valvular heart disease	Blood oozing from a vessel in duodenal bulb	Endoscopic epinephrine injection followed by photoocoagulation	Recovered
Gadenstatter <i>et al.</i> ¹³ 1998	Austria	32/M	Haematemesis	None	A pulsating vessel in the duodenal bulb covered by a clot, needle manipulation resulted in severe spurting haemorrhage	Endoscopic polidocanol 1% in 2 mL aliquots injection	Recovered
Schmulewitz and Baillie, ¹⁴ 2001	USA	80/M	Postural hypotension, melena	IHD, AF, rheumatic heart disease, cardiac failure, aortic aneurysm repair	Active bleeding site at 1.5 cm proximal to the main duodenal papilla	Electrocautery by heater probe	Recovered
Kasapidis <i>et al.</i> ¹⁵ 2002	Greece	51/M	Melena	None	Active bleeding stigmata in duodenal bulb	8 mL epinephrine solution 1:10 000; thermal therapy with heater probe	Recovered
Kasapidis <i>et al.</i> ¹⁵ 2002	Greece	55/M	Melena	None	Active bleeding stigmata in duodenal bulb	4 mL epinephrine solution 1:10 000; thermal therapy with heater probe	Recovered
Kasapidis <i>et al.</i> ¹⁵ 2002	Greece	52/M	Melena	None	Active bleeding stigmata in duodenal bulb	8 mL epinephrine solution 1:10 000; 2 mL ethanolamine oleate solution (5%)	Recovered
Kasapidis <i>et al.</i> ¹⁵ 2002	Greece	44/M	Melena	None	A visible blood vessel in duodenal bulb	8 mL epinephrine solution 1:10 000; thermal therapy with heater probe	Recovered
Ibrarullah and Wagholkar, ¹⁶ 2003	India	31/M	Haematemesis	Duodenal ulcer	Actively bleeding vessel in the postbulbar duodenum with normal surrounding mucosa	A perilesional and intralesional injection of 1:10 000 epinephrine solution	Recovered
Ibrarullah and Wagholkar, ¹⁶ 2003	India	25/F	Melena	None	Fresh blood oozing from a punctuate area on the roof of the duodenal bulb	1:10 000 epinephrine solution injection	Recovered
Mumtaz <i>et al.</i> ¹⁷ 2003	USA	77/M	AMI, haematemesis	CAD	Blood clot in the duodenum	Thermal therapy with heater probe	Died due to AMI complications
Mumtaz <i>et al.</i> ¹⁷ 2003	USA	76/M	Melena, COPD exacerbation	COPD	Blood clot in the duodenum	Thermal therapy with heater probe along with 2.5 cc epinephrine injection	Died due to respiratory failure with pneumonia
Ko <i>et al.</i> ¹⁸ 2005	Korea	79/F	Haematochezia, melena	None	Blood oozing in the duodenal diverticulum	Three disposable haemoclip	Recovered
Lopez-Arce <i>et al.</i> ¹⁹ 2008	Mexico	74/M	Melena	NSAID, antiplatelet use	Active bleeding in duodenum	Endoscopic haemostasis achieved	Recovered
Lopez-Arce <i>et al.</i> ¹⁹ 2008	Mexico	85/F	Melena	Anticoagulant use	Active bleeding in duodenum	Endoscopic haemostasis achieved	Recovered

Continued

Table 1 Continued

Author, year	Country	Age/Gender	Clinical presentation	Comorbidity	Endoscopy findings	Treatment	Outcome
Lopez-Arce <i>et al.</i> ¹⁹ 2008	Mexico	64/F	Haematemesis	None	Active bleeding in duodenum	Failed endoscopic initial treatment, managed with surgery	Recovered
Lopez-Arce <i>et al.</i> ¹⁹ 2008	Mexico	66/F	Melena	None	Active bleeding in duodenum	Failed endoscopic initial treatment, managed with surgery	Recovered
Rana <i>et al.</i> ²⁰ 2010	India	52/F	Melena	None	Fresh blood oozing from a pinpoint defect in the duodenal periampullary region	Surgical oversewing of the abnormal vessel	Recovered
Lee <i>et al.</i> ²¹ 2010	South Korea	67/M	Melena, haematemesis	Blunt abdominal trauma from traffic accident	Spurting jet of blood from the small vascular tuft located at the margin of the large (~6 cm in size) periampullary diverticulum	30 cc epinephrine and saline mixture followed by angiographic embolisation with five microcoils. Haemostasis was achieved with the application of two haemoclips.	Recovered
Coumaros and Tsesmeli, ²² 2010	France	86/F	Melena	IHD, chronic intake of low-dose aspirin	Actively bleeding lesion in the third duodenal portion	25 mL injection of epinephrine solution followed by monopolar electrocoagulation	Recovered
Sadio <i>et al.</i> ²³ 2010	Portugal	75/M	Haematochezia	Alcoholic liver cirrhosis	Solitary blood vessel with clots inside a diverticulum in second portion of duodenum without ulceration	4 mL of 1:10000 epinephrine solution and 1 mL of fibrin glue followed by 0.8 cc of N-butyl-2-cyanoacrylate/Lipiodol moisture (0.5/0.3 cc)	Recovered
Pinto <i>et al.</i> ²⁴ 2011	Portugal	80/F	Prostration, drowsiness, anaemia, haematemesis	Dementia, DM, HTN	Actively bleeding lesion in the anterior wall of the duodenal bulb	Endoscopic application of five haemostatic clips	Recovered
Eloubeidi and El Majzoub, ²⁵ 2012	Lebanon	67/M	Melena, haematemesis	Bilroth type I operation	A spurting blood vessel in the duodenum	Injection of epinephrine and endoscopic clips	Recovered
Rao <i>et al.</i> ²⁶ 2012	India	03/M	Fever, rash, loose stools, one episode of massive rectal bleed	None	Duodenotomy revealed a solitary pin-point arterial spurter in first part of duodenum with normal surrounding mucosa	Duodenotomy	Recovered
Alomari <i>et al.</i> ²⁷ 2013	USA	14/F	Fatigue, nausea, syncope	Massive GI bleed	On endoscopy, brisk bleeding in second duodenal part. Angiography identified active bleeding from a small branch of posterior pancreaticoduodenal artery into second portion of the duodenum	Embolisation of the bleeding branch with 50% N-butyl cyanoacrylate glue	Recovered
Gomerjic Palic and Ljubičić, ²⁸ 2013	Croatia	61/F	Melena	HTN, HLP	Blood oozing from a pin-point defect in duodenum with normal surrounding mucosa	Endoscopic placement of a nylon ring	Recovered
Mangjaviillano <i>et al.</i> ²⁹ 2013	Italy	35/F	Melena, sickness, syncopal episode	None	Haemorrhagic lesion in third duodenal portion	Endoscopic application of four metallic clips	Recovered
Gauci <i>et al.</i> ³⁰ 2014	Malta	74/M	Melena	Aortic stenosis with valve replacement	A vascular lesion in the first part of the duodenum	Duodenectomy	Recovered
Bilal <i>et al.</i> ³¹ 2015	Pakistan	18/F	Haematemesis	None	A <3 mm opening on a papillary lesion in the first part of the duodenum. On catheter manipulation, blood spurting exposing the culprit vessel	Epinephrine injection followed by endoscopic band ligation	Recovered
Lipka <i>et al.</i> ³² 2015	USA	69/F	Melena	GORD, PUD (non-bleeding), duodenal stenosis, benign colon polyps	Blood oozing in fourth portion of duodenum on single-balloon enteroscopy	Bipolar electrocoagulation followed by haemoclips placement	Recovered

Continued

Table 1 Continued

Author, year	Country	Age/Gender	Clinical presentation	Comorbidity	Endoscopy findings	Treatment	Outcome
Sathyamurthy <i>et al.</i> ³³ 2016	USA	63/F	Acute blood loss, anaemia, melena	ESRD, throat SCC, G-tube, DVT, colonic adenocarcinoma, duodenal bulb ulcers	Two lesions in second part of duodenum. One was a blood-spurting artery while the other was oozing blood.	5 mL epinephrine injection followed by placement of four clips	Recovered
Dirweesh <i>et al.</i> ³⁴ 2017	USA	21/M	Postural syncope, haematemesis	None	Actively bleeding calibre-persistent artery in the duodenal bulb	Epinephrine injection and endoscopic placement of two haemoclips	Recovered
Relea Perez <i>et al.</i> ³⁵ 2017	Spain	91/M	Haematemesis, rectal bleeding	AF	Blood oozing, non-ulcerated vascular lesion inside a diverticulum in the second duodenal portion	Epinephrine and polidocanol injection followed by placement of three endoclips	Recovered
The Present Report	USA	78/F	Melena	Spinal stenosis, arthritis, CKD, atrial flutter, SVT, mitral valve replacement	Actively bleeding blood vessel in second portion of the duodenum	APC followed by two haemoclips placement	Recovered

AF, atrial fibrillation; AMI, acute myocardial infarction; APC, argon plasma coagulation; BRBPR, bright red blood per rectum; CAD, coronary artery disease; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; DVT, deep venous thrombosis; ESRD, end-stage renal disease; F, female; GORD, gastro-oesophageal reflux disease; GI, gastrointestinal; G-tube, gastrostomy tube; HLP, hyperlipoproteinaemia; HTN, hypertension; IHD, ischaemic heart disease; M, male; NSAID, non-steroidal anti-inflammatory drug; PUD, peptic ulcer disease; SCC, squamous cell carcinoma; SVT, supraventricular tachycardia.

most of the patients. Furthermore, gentle endoscopic manipulation can be used to unravel the hidden bleeding vessels covered with blood clots. In one study, only 49% of Dieulafoy's lesions were identified on initial endoscopy, 33% of patients required a repeat endoscopy and 18% were eventually diagnosed on laparotomy.⁴¹ In this context, repeat endoscopic evaluation maybe required to identify the lesion.

Duodenal Dieulafoy's lesion is unique as it may mimic the commonly encountered entity of peptic ulcer disease and it can occasionally be missed due to blood clots, periampullary diverticulum or duodenal angulations. Therefore, duodenal disease highlights the need for extra vigilance. It is an interesting observation that if the endoscopy is performed within the first 12 hours of bleeding using the side-viewing technique, chances to diagnose duodenal disease are increased.⁴² Other endoscopic procedures like push enteroscopy and capsule endoscopy may also have limited diagnostic value. It is recently highlighted that endoscopic ultrasonography and radiological studies, such as contrast-enhanced CT or mesenteric angiography can be useful to identify the lesions.^{43–45} Although upper endoscopy can easily reach the duodenum and help to diagnose Dieulafoy's lesion, a detailed evaluation using a combination of endoscopic and radiological modalities can be considered in difficult-to-diagnose cases.⁴⁶

In terms of management, a consensus is non-existent. Surgical resection, including proximal gastric resection or wedge resection, was the mainstay of treatment for gastric Dieulafoy's lesions until the 19th century. In 1990, earliest endoscopic treatment of duodenal Dieulafoy's lesion was reported. The management of this disease is generally based on the clinical presentation, haemodynamic status, involved gastrointestinal location and the skill set of clinicians. As the lesion predominantly presents with the gastrointestinal haemorrhage, initial resuscitation with fluid replacement, blood transfusions and blood products is necessary. Recent reports have implicated endoscopic management as the treatment of choice.⁴⁷ Endoscopic techniques used to achieve haemostasis include local injection of epinephrine or occasionally cyanoacrylate, thermal or argon plasma coagulation and mechanical therapy like banding and haemoclipping.⁴⁸

Endoscopic injection therapy is simple, cheap and relatively safe initial treatment. In prior studies, vasoconstrictors, such as epinephrine (four doses of 2.5 mL each with dilution of 1:10 000) have commonly been employed to achieve primary haemostasis.⁴⁸ Sclerosant agents like ethanol, aethoxysklerol or polidocanol are also used. N-butyl 2 cyanoacrylate is a relatively newer compound that has rarely been administered in patients with Dieulafoy's lesion.^{23 27 49} Although the initial clinical outcomes are favourable with injection therapy, there is a risk of rebleeding with this method. Therefore, injection therapy may serve two major purposes: (1) it can help to stop the acute haemorrhage achieving temporary haemostasis that can help stabilise the patients presenting with haemodynamic compromise; (2) duodenal Dieulafoy's lesion often present with diagnostic dilemma as the bleeding site is difficult to pinpoint. Injection therapy can help to effectively enhance the visualisation to permanently manage the lesion in combination with other endoscopic techniques.⁵⁰

Thermal therapy has been categorised into contact and non-contact methods. Contact thermocoagulation includes methods like bipolar and heater probes. These are effective techniques but there is a risk of transmural injury. Argon plasma coagulation is the non-contact method, which is effective and safer than the contact methods. However, the major limitation of this thermal therapy is that it improves clinical outcomes mainly in patients presenting with the superficial Dieulafoy's lesion.⁵⁰ Furthermore, angiography

with gel-foam embolisation is another potential treatment modality used in a limited number of cases.⁵¹

Mechanical methods, including haemoclip application and band ligation, are preferred endoscopic procedures.⁵² The efficacy of haemoclip method can be increased with the use of epinephrine injections. Band ligation has a slight advantage over haemoclip application as it carries low risk of gastrointestinal tract perforation.⁵³ However, rebleeding ulcers around ligation points and time delay to apply the bands are few concerns associated with the band ligation. In view of these therapeutic benefits, endoscopic management can be employed in nearly all the Dieulafoy's lesions and primary haemostasis maybe achieved in over 90% of patients.⁵⁴ In terms of duodenal lesions, acute duodenal angulations render it relatively difficult to use mechanical techniques alone. Furthermore, the patients who were managed with epinephrine monotherapy and the ones who presented with active arterial spurting had relatively higher risk for rebleeding.⁵⁵ Therefore, a combination of injection and thermal therapies may have higher success rates.

Although the rates of surgical intervention have drastically decreased, it should be considered in patients with duodenal Dieulafoy's lesion where endoscopic management fails or the necessary endoscopic equipment and/or skill set is lacking. The precise location of the lesion is imperative for surgery. If surgery is undertaken on the bleeder that has endoscopically been identified, the respective duodenal portion should be longitudinally opened. In cases where the exact site is unknown, opening the anterior wall of duodenal bulb is preferred as it will help the surgeon to have a broad access to duodenum.⁵⁶ The bleeding site can be controlled with a three-point U-stitch method. The surgeons should be particularly careful to preserve the common bile duct in this procedure. Eventually, the transverse closing of duodenum should be performed to avoid subsequent narrowing of the lumen. In cases of Dieulafoy's lesion of the duodenum where the intraoperative identification of the bleeder cannot be established, emergent pancreaticoduodenectomy should be considered.⁵⁶ However, surgery has a higher mortality rate as often times these patients may already be haemodynamically unstable by the time surgical management is considered.⁵⁶

The risk of rebleeding from the Dieulafoy's lesion has been reported to vary from 9% to 40%.⁵⁷ When rebleeding is encountered, the diagnostic and treatment algorithm remains the same as with the initial presentation. Due to this risk of rebleeding, a regular follow-up for at least 6 months is recommended.⁵⁷

Learning points

- ▶ Dieulafoy's lesion is an important cause of gastrointestinal haemorrhage that can occur in the duodenum.
- ▶ Endoscopy frequently identifies this lesion in haemodynamically stable patients, and a combination of endoscopic injection therapy with mechanical methods may have relatively a higher therapeutic yield.
- ▶ Surgical treatment can be considered when endoscopic approaches have failed, especially when patients are haemodynamically unstable.
- ▶ Although it is relatively rare and often difficult to diagnose, clinicians should maintain a high index of suspicion for this disease in aetiological evaluation of patients presenting with gastrointestinal haemorrhage.
- ▶ Future research should aim to establish standard diagnostic and therapeutic guidelines.

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