Argon Plasma Coagulation in the Management of Different Types of Gastric Vascular Ectasia: Experience in Egyptian Patients

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Abstract: Background: Gastric vascular ectasia (GVE) is a distinct vascular abnormality, including various subtypes. It is a well-known cause of gastrointestinal bleeding. Various endoscopic treatment modalities have been tried in this condition. **Aim of the study:** This study is designed to evaluate the efficacy of argon plasma coagulation (APC) on various subtypes of GVE. **Patients & methods:** From November 2010 to October 2011, thirty patients with different forms of GVE were enrolled, divided into 3 subgroups: portal hypertensive gastropathy (PHG) (n=10), focal vascular ectasia (FVE) (n=10), and gastric antral vascular ectasia (GAVE) (n=10). They were followed-up for 3 months with repeated sessions of APC. The APC settings were 30 to 40W and 1.5 to 2L/min of argon plasma flow. Efficacy of APC was evaluated on the basis of patient's symptoms, transfusion requirements, number of hospitalization, hemoglobin and haematocrit levels. **Results:** The mean number of APC sessions was 2.3±0.82, 2±0.81 and 1.9±0.87 in PHG, FVE and GAVE groups respectively. Patients with PHG were the most susceptible for re-bleeding (30%) after 1st APC session. The rise in haemoglobin was highly significant in all three groups (p=0.0001). A significant reduction in packed RBCs transfusion rates was also noted in the 3 groups (p=0.0001). No complications occurred. **Conclusion:** APC appears to be a simple, safe, and effective technique in the management of different forms gastric vascular ectasia lesions.

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1. Introduction

Gastric vascular ectasia (GVE) lesions are recognized as an increasingly important source of upper gastrointestinal bleeding (UGIB). The clinical presentation could be iron deficiency anemia due to chronic blood loss or acute bleeding with hematemesis and melena. Patients usually have recurrent episodes of bleeding and require multiple transfusions and in some cases may become transfusion dependant [1].

Upper GI endoscopy is the standard diagnostic test for GVE lesions. The usual appearance of GVE on endoscopy includes different forms as portal hypertensive gastropathy (PHG) which appears as mosaic like or reticular pattern of gastric mucosa. A similar pattern can be seen through the stomach called gastric antral vascular ectasia (GAVE) or watermelon stomach. Also focal vascular ectasia (FVE) considered when a limited number of red flat spots or reticulated vascular areas present in gastric mucosa without a mosaic pattern [2].

Various endoscopic techniques are used to treat GVE in the setting of GIT bleeding, heat and multipolar probes are used, but their efficacy depends on the number and extension of lesions. Argon plasma coagulation (APC) appears to be easier to use and is safe and more effective than others [3]. APC has many advantages over other endoscopic therapies. The unit is mobile, compact, easy to maintain and requires a lower initial capital expenditure than other therapies. The noncontact technique allows for the treatment of larger areas more rapidly than the use of the heater probe or bipolar cautery. APC has a predictable depth of penetration when used without mucosal contact and allows tangential arcing to lesions that are not directly in view or are behind folds [4].

Despite different forms of treatment, there is still a little knowledge on the efficacy of argon plasma coagulation (APC) in different subgroups of GVE lesions. This study was designed to evaluate the efficacy of APC in patients admitted to the hospital with UGIB because of GVE.

2. Patients and methods:

Thirty patients with UGIB, melena or anaemia were enrolled in the present study. The patients were selected from all cases presented to outpatient clinic or admitted at ICU department at Ain Shams University hospital in the period from November 2010 to October 2011. According to the endoscopic findings, they were divided into 3 subgroups: portal hypertensive gastropathy (PHG) (n=10), focal vascular ectasia (FVE) (n=10), and gastric antral vascular ectasia group (GAVE) (n=10).

Patients with peptic ulcer, esophageal varices, gastric or esophageal malignancy, or gastropathy due

to NSAIDS or alcohol, or patients unable to give an informed consent were excluded from the study.

All patients were subjected to a thorough medical history, full clinical examination, hemoglobin concentration and haematocrit value. Upper GI endoscopy (Pentax videoscope) was done and APC was performed, with the patient under deep sedation with midazolam, by using a high-frequency electrosurgical generator, APC (Tekno, Germany) coupled to an argon gas delivery unit. The APC settings were 30 to 40W and 1.5 to 2L/min of argon plasma flow. The sessions aimed at treating as much surface and as many lesions as possible, and considered as intensive treatment. The treatment included bleeding and non-bleeding areas. All lesions were treated until the mucosa became white in appearance after electrocoagulation. All patients were followed up for the next 3 months following the procedure, during which they were informed to contact our unit or to go to the hospital emergency department if they developed melena or hematemesis or a need for further blood transfusion. APC was repeated every 2 to 4 weeks according to the endoscopic appearance of the lesions.

Efficacy of APC was evaluated on the basis of patient's symptoms, incidence and frequency of re-bleeding, transfusion requirements, hemoglobin levels and haematocrit values and hospitalization rate.

The data was collected and statistically analyzed by IBM computer using SPSS (statistical program for social science version 15). Numerical parametric data were presented as mean±SD (standard deviation), categorical data as number and percentage. Chi-Square test was used to examine the relationship between two qualitative variables, Paired t-test was used to assess the statistical significance of the difference between two means measured twice for the same study group, Fisher's exact test to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells, ANOVA test to assess the statistical significance of the difference between more than two study group means. The level of significance was accepted when the p <0.05.

3. Results:

The study included 10 patients in PHG group, males/females (5/5), with a mean age of 49.9±4.1 years, 10 patients in FVE group, males/females (2/8), with a mean age of 31.8±10.9 years, and 10 patients in GAVE group, males/females (8/2) with mean age of 57.3±7.9 years. Presenting complaints were haematemesis, melena or anemia. Most of the patients in the three groups were presented by haematemsis rather than melena or anaemia. The pattern of active bleeding in all of these cases was oozing. The patients' characteristics are shown in table 1.

Regarding the number of APC sessions among different groups, 2 patients in PHG group required 1 session, 3 required 2 sessions, and 5 required ≥ 3 sessions with a mean number of sessions of 2.3±0.82. In FVE group 3, 4 and 3 patients required 1, 2, 3 or more sessions respectively (mean = 2±0.81). While in GAVE group 4, 3 and 3 patients required 1, 2, 3 or more sessions respectively (mean = 1.9±0.87) (p=0.89). (Table 2)

Initial hemostasis was achieved by APC during endoscopy in all cases. The median duration of re-bleeding after APC treatment was 20 days. During the period of follow up (3months) after 1st APC session, patients of PHG group were more susceptible for re-bleeding (30%) rather than those of FVE and GAVE groups (0% and 10% respectively). Yet, the difference did not reach significance (p=0.286).

Table 3 shows both clinical and laboratory improvements that occurred 3 months after APC sessions. Regarding haemoglobin level, it increased from 9.7±0.9 to 10.9±0.8 g/dl in PHG group (p=0.0001), from 9.9±1.1 to 11±1.2 g/dl in FVE group (p=0.0001), while in GAVE group it increased from 9.5±2.2 to 10.4±2.1 g/dl (p=0.0001). The rise in hematocrit from baseline values was evident in all groups. This rise was not significant in PHG group (p=0.065), significant in GAVE group (p=0.049), and highly significant in FVE group (p=0.007).

A significant reduction in packed RBCs transfusion rates was noted in the 3 groups (p=0.0001). Mean number of packed RBCs units in PHG was 3.7±0.67 pre APC, and 0.4±0.7 post APC. In FVE group, it was 3.0±1.56 units pre APC, and was 0.0±0.0 unit post APC. While in GAVE group, mean transfused units was 2.8±1.48 units pre APC and 1.3±0.48 units post APC. All were statistically highly significant (p=0.0001). (Table 3)

Table (1): Demographic data of the studied groups

PHG	FVE (n=10)	GAVE (n=10)	*test* (n=10)	*p*
Age (yrs)				
mean±SD	49.9±4.06	31.8±10.9	57.3±7.86	X^2=7.02 0.034
Male/Female	5/5	2/8	8/2	F=26.09 0.001

X^2: Chi Square test, F: ANOVA test

Table (2): number of APC sessions in each group

PHG	FVE n (%)	GAVE n (%)		*test*	*p*
1 Session	2 (20)	3 (30)	4 (40)	Fisher	
2 Sessions	3 (30)	4 (40)	3 (30)	1.711	0.89
3 Or more	5 (50)	3 (30)	3 (30)		
Mean no. of sessions	2.3±0.82	2±0.81	1.9±0.87	F=0.616	0.548

n: number of patients underwent APC sessions, F: ANOVA test

Table (3): Clinical and laboratory data of different groups pre and post APC

	Pre APC (Mean±SD)	**Post APC** (Mean±SD)	*t-test*	*p*
PHG group				
Hb (g/dl)	9.7±0.9	10.9±0.8	7.63	0.0001
Haematocrit	31.5±4.4	34.5±4.6	2.1	0.065
Packed RBCs	3.7±0.67	0.4±0.7	11	0.0001
Hospitalization	1.6±0.51	0.4±0.6	6	0.0001
FVE group				
Hb (g/dl)	9.9±1.1	11±1.2	6.75	0.0001
Haematocrit	32.6±4.7	35.6±4.3	3.45	0.007
Packed RBCs	3±1.56	0	6.068	0.0001
Hospitalization	1.5±0.85	0	3.458	0.0001
GAVE group				
Hb (g/dl)	9.5±2.2	10.4±2.1	11.82	0.0001
Haematocrit	31.6±6.9	33.1±7.9	2.28	0.49
Packed RBCs	2.8±1.48	1.3±0.48	6.38	0.0001
Hospitalization	1.3±0.48			

4. Discussion:

Gastric vascular ectasia induce a wide spectrum of clinical manifestations. However, most of these lesions are asymptomatic [5]. Upper-GI vascular ectasias are often diagnosed in the setting of iron deficiency anemia or GI bleeding [6]. Regardless of the pattern, bleeding begins with injury by either gastric acid or intraluminal food to the mucosal epithelium overlying the engorged vessels. In patients with overt GI bleeding from vascular ectasia lesions, it is recommended to do endoscopic treatment. Many endoscopic techniques are used to treat Upper GI vascular ectasias, including sclerotherapy, multipolar electrocoagulation, argon and laser photocoagulation, and APC [5].

APC treatment is characterized by noncontact coagulation, which allows tangential application and thus treatment of the target site in a uniform manner to a depth of approximately 1 to 3 mm, which is sufficient to coagulate the superficial blood vessels [7]. Successful APC therapy leads to whitish coagulation of the mucosa and the disappearance of the underlying vascular structures. The coagulation depth of APC depends on the power generator setting, the distance from the target tissue, and the duration of the application [8]. Histologically, the tortuous ectatic vessels of vascular ectasia extend superficially over the submucosal layer [9]. For this reason, variable power settings (30–100 W) and flow rates of argon gas (0.8–2 liter/min) have been reported to be safe and effective for hemostasis of bleeding vascular ectasia.

Despite studies on the different forms of treatment, there are few articles that evaluated the outcome and prognosis of patients admitted with UGIB secondary to GVE. There is also little information on the efficacy of APC in different subgroups of GVE lesions in patients with UGIB at admission. Therefore, this study was designed to prospectively evaluate the efficacy and clinical outcome of patients admitted to the hospital with acute UGIB because of GVE and treated with APC.

A total of thirty patients with GVE complaining of upper gastrointestinal bleeding, melena or anaemia were involved in the present study, and according to the endoscopic findings, they were divided into three groups, PHG group (n=10), FVE group (n=10) and GAVE group (n=10).

Our series showed a lower mean number of APC sessions needed by GAVE group followed by FVE group compared with PHG group (p=0.548). This could be explained by the area with potential for bleeding which is obviously smaller in GAVE and FVE patients than in those with PHG, where there are multiple discrete red lesions of submucosal haemorrhagic spots all over the gastric mucosa in case of PHG.

In contrast to our results, Herrera *et al*. [1] reported that the highest number of APC sessions was done in GAVE group rather than PHG and FVE. Furthermore, in another study it was found that median number of APC sessions was 3 sessions (range 2.5-5) for those with portal hypertension (PHG), and 5 sessions for those without portal hypertension [10].

After 1st APC session, patients of PHG group were more susceptible for re-bleeding (30%) rather than those of FVE and GAVE groups (0% and 10% respectively). Yet, the difference did not reach significance (p=0.286). This was in disagreement with Herrera *et al*. [1] who found that re-bleeding had occurred only in one patient with GAVE, while there was no relapse among PHG or FVE groups. Anyway, the bleeding tendency associated with liver cirrhosis may have been responsible for the higher re-bleeding rates in patients with either PHG or GAVE. On the other hand, the endoscopic appearance of FVE is single or multiple discrete red lesions 2 to 10 mm in size, whereas GAVE is characterized chiefly by erythematous stripes radiating in a spoke-like fashion from the pylorus to the antrum, mimicking a "watermelon" appearance. Therefore, the area with potential for bleeding is obviously larger in GAVE as well as PHG patients than in those with FVE. Therefore, the higher re-bleeding rate in the PHG and GAVE patients despite careful and thorough treatment by APC is a predictable outcome.

The immediate efficacy of APC treatment was demonstrated by the prompt rise of Hematocrit values in all groups. Dulai *et al*. [10] showed similar results where palliative endoscopic treatment of watermelon stomach patients with and without portal hypertension was associated with a significant rise in hematocrit values. Moreover, The Hematocrit rose progressively in all patient groups during the mean 23.1 months of follow-up, thereby demonstrating the efficacy of APC treatment [1].

It was also remarkable in our study that APC was useful in recovering Hb levels (p=0.0001) and in reducing transfusion requirements (p =0.0001) in patients of the 3 groups admitted for active bleeding. Most of the previous studies were in agreement with our results showing that APC therapy is effective in both restoring Hb levels and reducing blood transfusion rates [1, 3-6, 10-12].

In conclusion, endoscopic hemostasis with APC is an effective and safe modality for treatment of various subtypes of GVE and in reducing transfusion requirements. It is associated with a low complication rate. Yet, Multicenteric studies are recommended to evaluate role of APC in managing different types of GVE.

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