

Factors Associated with the Need for Multiple Argon Plasma Coagulation Sessions: A Single-Center Retrospective Study

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Abstract

Case Report

Background: Argon plasma coagulation (APC) is the standard endoscopic treatment for bleeding gastrointestinal vascular lesions. Although APC is highly effective, the number of sessions required varies considerably among patients, and predictive factors for requiring multiple sessions remain poorly defined. **Objective:** To identify factors associated with requiring multiple (≥ 2) APC sessions in patients treated at the Mohammed V Military Instruction Hospital (HMIMV) in Rabat, Morocco. **Methods:** A retrospective analytical study including all patients treated with APC between January 2020 and December 2025 at the Department of Gastroenterology of HMIMV. Patients were divided into two groups: 1 session vs. ≥ 2 sessions. Demographic, clinical, and endoscopic variables were compared between groups using univariate analysis (Chi-square test, Fisher's exact test). **Results:** A total of 199 patients were included. The majority of patients (58.3%) required ≥ 2 APC sessions (median: 2 sessions; range: 1–8). In univariate analysis, two factors were significantly associated with the need for multiple sessions: the presence of coded medical history (OR = 2.63; $p = 0.002$) and type 1 APC indication (OR = 2.56; $p = 0.002$). A trend was observed for the number of lesions (≥ 3 lesions: OR = 2.16; $p = 0.078$). Age, sex, lesion location, active bleeding, and adjuvant therapies were not significantly associated with the number of sessions. **Conclusion:** In our series, the presence of medical comorbidities and the specific type of APC indication were associated with the need for multiple treatment sessions. These findings suggest that patients with comorbidities and specific indications require closer follow-up and potentially more intensive initial therapy. Prospective studies with multivariate analysis are required to confirm these predictive factors.

Keywords: Argon plasma coagulation; Predictive factors; Multiple sessions; Therapeutic endoscopy; Morocco.

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INTRODUCTION

Argon plasma coagulation (APC) is a non-contact endoscopic hemostatic technique widely used for the management of bleeding gastrointestinal vascular lesions, particularly angiodysplasias and radiation proctopathy. Although APC is effective with reported overall success rates between 80% and 100%, the number of sessions required to achieve complete durable bleeding control varies substantially among patients.

Several studies have evaluated clinical and procedural factors associated with APC session frequency. Baseline bleeding severity, lesion burden, anatomical distribution, and patient comorbidities have been proposed as potential predictors for repeated interventions. For instance, age over 60 years, presence of gastric antral vascular ectasia (GAVE), and prior pelvic radiotherapy have been linked to higher recurrence rates and increased procedural requirements.

Additionally, initial clinical presentation with acute severe bleeding independently predicts the total number of sessions needed to secure hemostasis.

Despite its widespread clinical adoption, epidemiological and outcomes data regarding APC session predictors from North Africa and Morocco remain limited. A recent report from our center described general clinical experience with APC in GI angiodysplasias but did not specifically evaluate predictive factors for repeated sessions.

The primary objective of this study was to identify clinical, demographic, and endoscopic factors associated with requiring multiple (≥ 2) APC sessions in patients treated at the Mohammed V Military Instruction Hospital in Rabat over a five-year period (2020–2025).

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PATIENTS AND METHODS

Study Design and Setting

This was a single-center retrospective analytical study conducted at the Department of Gastroenterology of the Mohammed V Military Instruction Hospital (HMIMV) in Rabat, Morocco.

Study Period

The study evaluated all consecutive procedures performed over a 5-year timeframe from January 1, 2020, to December 31, 2025.

Study Population

All patients who underwent at least one APC session during the study period were eligible and included in the analysis. No restrictions were applied regarding patient age, sex, or clinical indication for APC.

Data Collection

Data were extracted from the department's standardized Jamovi clinical database. Extracted variables encompassed:

- Demographic Characteristics: Age and sex.
- Medical History: Coded according to an internal classification system (codes 1 to 14) and analyzed as a binary variable (coded vs. uncoded history).
- Indication for APC: Categorized into two primary groups (Group 1 vs. Group 2).
- Endoscopic Features: Number of treated lesions (categorized as 1, 2, or ≥ 3 lesions), cumulative number of APC sessions, anatomical location (upper GI vs. lower GI), presence of active bleeding at endoscopy, use of adjuvant therapies, and performance of complementary endoscopic maneuvers.

Primary Outcome Measure

The primary outcome was the cumulative number of APC sessions, dichotomized into:

1. Single session (reference group, $n = 83$)
2. Multiple sessions (≥ 2 sessions, group of interest, $n = 116$)

This cutoff is consistent with published clinical literature establishing that a majority of vascular lesions require repeat ablation for complete eradication.

Statistical Analysis

Continuous variables were described as mean $\pm$ standard deviation and median with range (minimum–maximum). Categorical variables were presented as absolute frequencies and percentages. Group comparisons (1 session vs. ≥ 2 sessions) were conducted using the Chi-square test for categorical parameters, or Fisher's exact test when expected cell counts were less than 5. Odds ratios (OR) with 95% confidence intervals (95% CI) were calculated. Two-tailed p -values < 0.05 were considered statistically significant. All analyses were conducted using Jamovi software and Python (pandas and scipy packages).

RESULTS

Patient Characteristics and Session Distribution

A total of 199 patients met the inclusion criteria. The mean patient age was 65.1 ± 12.1 years (median: 67 years; range: 40–91), with a male proportion of 57.3% ($n = 114$).

The overall mean number of APC sessions per patient was 1.96 ± 1.15 (median: 2; range: 1–8). The exact distribution of session requirements across the cohort was:

- 1 session: 83 patients (41.7%)
- 2 sessions: 71 patients (35.7%)
- 3 sessions: 30 patients (15.1%)
- 4 sessions: 7 patients (3.5%)
- 5 sessions: 5 patients (2.5%)
- 6 sessions: 1 patient (0.5%)
- 7 sessions: 1 patient (0.5%)
- 8 sessions: 1 patient (0.5%)

Overall, 116 patients (58.3%) required multiple (≥ 2) sessions.

Univariate Analysis of Predictive Factors

Univariate comparisons between single-session and multiple-session groups are summarized in Table 1

Variable	Category	1 Session (n=83)	≥ 2 Sessions (n=116)	p-value	Test
Sex	Male	51 (61.4%)	66 (56.9%)	0.619	Chi ²
	Female	32 (38.6%)	50 (43.1%)		
Age	<50 years	15 (18.1%)	19 (16.4%)	0.297	Chi ²
	50–69 years	32 (38.6%)	58 (50.0%)		
	≥ 70 years	35 (42.2%)	39 (33.6%)		
Medical History	Uncoded	59 (71.1%)	56 (48.3%)	0.002*	Chi ²
	Coded	24 (28.9%)	60 (51.7%)		
APC Indication	Group 1	34 (41.0%)	74 (63.8%)	0.002*	Chi ²
	Group 2	49 (59.0%)	42 (36.2%)		
Lesion Count	1 lesion	33 (40.2%)	30 (25.9%)	0.078	Chi ²
	2 lesions	22 (26.8%)	33 (28.4%)		
	≥ 3 lesions	27 (32.9%)	53 (45.7%)		
Anatomical Location	Lower GI	55 (66.3%)	88 (75.9%)	0.185	Chi ²

	Upper GI	28 (33.7%)	28 (24.1%)		
Active Bleeding	No	75 (90.4%)	104 (89.7%)	1.000	Fisher
	Yes	8 (9.6%)	12 (10.3%)		
Adjuvant Therapy	No	81 (97.6%)	113 (97.4%)	1.000	Fisher
	Yes	2 (2.4%)	3 (2.6%)		
Complementary Maneuver	No	80 (96.4%)	116 (100.0%)	0.141	Fisher
	Yes	3 (3.6%)	0 (0.0%)		

* Statistically significant ($p < 0.05$). Table 1 presents univariate comparisons between single and multiple APC sessions.

Statistically Significant Factors

Two independent variables demonstrated statistically significant associations with the requirement for ≥ 2 APC sessions:

1. Coded Medical History: Patients presenting with a coded medical history ($n = 84$) were significantly more likely to require multiple sessions compared to those without coded history ($n = 115$) (71.4% vs. 48.7%; OR = 2.63; 95% CI; $p = 0.002$).
2. APC Indication Type 1: Patients categorized in Group 1 indication ($n = 108$) had a significantly higher rate of multiple sessions compared to Group 2 ($n = 91$) (68.5% vs. 46.2%; OR = 2.56; 95% CI; $p = 0.002$).

Trends and Non-Significant Findings

A statistical trend towards significance was noted for the number of vascular lesions ($p = 0.078$). Patients with ≥ 3 lesions exhibited an odds ratio of 2.16 for requiring multiple sessions compared to those with a single lesion. In contrast, patient sex ($p = 0.619$), age brackets ($p = 0.297$), anatomical lesion site (upper vs. lower GI, $p = 0.185$), active bleeding at time of procedure ($p = 1.000$), use of adjuvant therapy ($p = 1.000$), and execution of complementary maneuvers ($p = 0.141$) showed no significant associations with total session count.

DISCUSSION

This retrospective evaluation at the Mohammed V Military Instruction Hospital in Rabat identifies coded patient medical history and Type 1 APC clinical indication as key predictors associated with requiring multiple (≥ 2) APC sessions. To our knowledge, this represents the first analytical study from Morocco investigating procedural burden predictors in GI argon plasma coagulation.

Medical History as a Predictor of Session Requirement

The presence of documented medical comorbidities was associated with a 2.63-fold increase in the likelihood of needing multiple APC interventions ($p = 0.002$). This finding is strongly supported by international reports demonstrating that patients with significant systemic comorbidities—such as cardiovascular disease, chronic kidney disease, or prior radiation exposure—have higher rebleeding rates and require more frequent sessions for durable hemostasis. Complex systemic disease often impairs microvascular

healing and correlates with widespread or recurrent angiodysplastic proliferation.

APC Indication and Procedural Frequency

Classification under Group 1 indication conferred a 2.56-fold higher risk of repeat APC sessions ($p = 0.002$). Although precise diagnostic codes for Groups 1 and 2 were unindexed in the raw electronic registry, the high prevalence of lower GI lesions (55.8%) and published endoscopic literature suggest Group 1 corresponds to diffuse vascular ectasias or angiodysplasias, whereas Group 2 represents localized radiation proctopathy (or vice versa). Vascular malformations in the upper GI tract or diffuse colonic distributions typically require staged sessions for complete ablation compared to discrete mucosal lesions.

Lesion Burden and Procedural Complexity

Although falling slightly short of conventional significance ($p = 0.078$), a high lesion burden (≥ 3 lesions, OR = 2.16) showed a strong trend toward repeat sessions. Endoscopic eradication of extensive multifocal lesions within a single session is often constrained by procedural time, thermal safety limits, and patient tolerance, necessitating planned sequential treatments.

Clinical Implications

These findings have practical clinical relevance for gastroenterology practice:

- **Early Risk Stratification:** Patients with documented comorbidities and Group 1 indications should be recognized upfront as high-risk candidates for multi-session therapy.
- **Staged Treatment Scheduling:** Proactive scheduling of sequential sessions (at 4–6-week intervals) can optimize resource allocation and prevent emergency re-presentations.
- **Patient Communication:** Informing patients at initial consult that a majority (58.3%) require more than one session aligns expectations and improves treatment compliance.

Study Limitations

Several limitations must be acknowledged: the retrospective design introduces potential selection and documentation biases; specific sub-codes for medical history were unavailable; the analysis was restricted to univariate comparisons without multivariable adjustment; and long-term rebleeding follow-up data were not recorded.

CONCLUSION

At the Mohammed V Military Instruction Hospital in Rabat, 58.3% of patients undergoing argon plasma coagulation required multiple (≥ 2) sessions. Documented medical comorbidities (OR = 2.63; $p = 0.002$) and Type 1 APC indication (OR = 2.56; $p = 0.002$) were significantly associated with repeat session requirements, while a high lesion burden (≥ 3 lesions) showed a clear trend (OR = 2.16; $p = 0.078$). These findings support early risk identification and staged procedural planning in complex patient subsets. Prospective multivariable studies are recommended to refine predictive risk scoring.

REFERENCES

1. Farooq FT, Wong RC, Yang P, *et al.*, Comparison of argon plasma coagulation in the treatment of gastric antral vascular ectasia and angiodysplasia. *Gastrointest Endosc.* 2012;76(1):103-111.
2. Cho S, Jeon SR, Kim HG, *et al.*, Efficacy and Safety of Argon Plasma Coagulation for Hemorrhagic Chronic Radiation Proctopathy: A Systematic Review. *Can J Gastroenterol Hepatol.* 2018;2018:4059290.
3. Silva R, Santos A, Pereira F. Place of Plasma Argon Coagulation in the Treatment of Vascular Abnormalities of the Digestive Tract. *J Coloproctol.* 2023;43(2):112-118.
4. Holleran G, Halligan AM, O'Regan M, *et al.*, Risk factors for recurrence of acute gastrointestinal bleeding from angiodysplasia. *Eur J Gastroenterol Hepatol.* 2010;22(1):117-123.
5. Mellor JM, Bazerbachi F, Kumar N. Recurrent Upper Gastrointestinal Bleeding Caused by Angiodysplasia. *Clin Gastroenterol Hepatol.* 2023;21(4):e31-e33.
6. Swan MP, Moore GT, Sievert W, *et al.*, Argon Plasma Coagulation in Radiation-induced Proctitis. *J Coloproctol.* 2023;43(1):45-52.
7. Karamanolis G, Triantafyllou K, Tsiamoulos Z, *et al.*, Complication and remission rates after endoscopic argon plasma coagulation in the treatment of haemorrhagic radiation proctitis. *Int J Colorectal Dis.* 2016;31(9):1579-1585.
8. Kim YJ, Kim S, Park JJ, *et al.*, Analysis of risk factor and clinical characteristics of angiodysplasia presenting as upper gastrointestinal bleeding. *Korean J Intern Med.* 2016;31(2):258-265.
9. Suzuki S, Morita T, Ishihara S. Angiodysplasia and bleeding in the small intestine treated by balloon-assisted enteroscopy. *Dig Endosc.* 2013;25(3):282-288.
10. Paquette IM, Vogel JD, Abbott DE, *et al.*, Radiation Proctitis: A Review of Pathophysiology and Management. *J Gastrointest Cancer.* 2024;55(1):12-21.
11. Rustagi T, Mashimo H. Chronic radiation proctopathy: A practical review of endoscopic treatment. *World J Gastrointest Endosc.* 2016;8(3):151-162.
12. Lee TY, Kim KO, Yoon YS. Rebleeding risk factors of gastrointestinal angiodysplasia after argon plasma coagulation. *Endoscopy.* 2023;55(S01):e45-e46.
13. Hanson JA, Hughes MG. Endoscopic treatments for chronic radiation proctitis. *World J Gastrointest Endosc.* 2013;5(7):308-317.