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ORIGINAL ARTICLE

Anal melanoma in Colombia: A retrospective cohort survival study from an institutional melanoma registry

Melanoma anal en Colombia: Estudio de supervivencia de cohorte retrospectiva basado en un registro institucional de melanoma

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Abstract

Introduction. Anal melanoma (AM) is an uncommon and aggressive mucosal melanoma subtype with a poor prognosis. Evidence from Latin America is scarce, and no Colombian study has characterized survival or treatment patterns in AM.

Methods. We performed a retrospective cohort analysis using a national institutional melanoma registry (2010–2021). From 766 melanoma cases, all patients with histologically confirmed anal or anorectal primary melanoma (ICD-10 C21.x) were included. Clinical, pathological, treatment, and survival data were extracted from electronic medical records. Overall survival (OS) was estimated using Kaplan–Meier analysis.

Results. Seven patients (0.9%) had AM. The median age at diagnosis was 61 years; 71.4% were female, most belonged to low socioeconomic strata. Diagnostic delay was frequent: median symptom-to-diagnosis interval was 7 months. At presentation, 71.4% had distant metastases; ulceration was present in 85.7%. Treatments included wide/local excision (42.8%), abdominoperineal resection (28.6%), radiotherapy (57.1%), and systemic therapy (71.4%), including immune checkpoint inhibitors. Toxicities led to treatment discontinuation in some cases. Median OS: 9.4 months; patients diagnosed with metastatic disease had an OS of 4.2 months. Six patients died despite multimodal therapy. The only 5-year survivor was diagnosed incidentally at an early stage.

Conclusion. Anal melanoma in Colombia is rare but almost uniformly fatal. Delayed diagnosis—due to nonspecific anorectal symptoms and limited access to specialist evaluation—was the dominant driver of poor survival. Early

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detection, particularly in patients with a personal history of melanoma, is crucial. Prompt anorectal examination and biopsy of persistent symptoms may offer the only opportunity to alter prognosis.

Keywords: anal neoplasms; melanoma; survival analysis; treatment; Colombia.

Resumen

Introducción. El melanoma anal es un subtipo infrecuente y agresivo de melanoma mucoso, asociado con mal pronóstico. La evidencia en América Latina es limitada y en Colombia no se han caracterizado la supervivencia ni los patrones de tratamiento del melanoma anal.

Métodos. Se realizó un análisis de cohorte retrospectiva utilizando un registro institucional nacional de melanoma (2010–2021). De 766 casos, se incluyeron todos los pacientes con melanoma primario anal o anorrectal confirmado histológicamente (CIE-10 C21.x). Se recolectaron datos clínicos, patológicos, terapéuticos y de supervivencia a partir de historias clínicas electrónicas. La supervivencia global se estimó mediante el método de Kaplan–Meier.

Resultados. Siete pacientes (0,9 %) presentaron melanoma anal. La mediana de edad fue de 61 años; el 71,4 % eran mujeres, y la mayoría pertenecía al estrato socioeconómico bajo. El retraso diagnóstico fue frecuente, con una mediana de 7 meses. Al diagnóstico, el 71,4 % tenía metástasis a distancia y el 85,7 % presentaba ulceración. Los tratamientos abarcaron escisión local (42,8 %), resección abdominoperineal (28,6 %), radioterapia (57,1 %) y terapia sistémica (71,4 %), incluidos inhibidores de puntos de control inmunitario. La supervivencia global mediana fue de 9,4 meses; en enfermedad metastásica fue de 4,2 meses. Seis pacientes fallecieron pese al tratamiento multimodal; el único superviviente a 5 años fue diagnosticado en estadio temprano.

Conclusiones. El melanoma anal en Colombia es raro, pero casi uniformemente fatal. El diagnóstico tardío fue el principal determinante de la baja supervivencia. El examen anorrectal temprano y la biopsia en síntomas persistentes pueden ser la única oportunidad para modificar el pronóstico.

Palabras clave: neoplasias del ano; melanoma; análisis de supervivencia; tratamiento; Colombia.

Introduction

Anal melanoma (AM) is an uncommon, highly aggressive mucosal melanoma with dismal outcomes; most series report 5-year overall survival <20% and median survival measured in months, largely driven by late presentation and early systemic spread [1]. Within the spectrum of mucosal melanoma, the anorectum accounts for a substantial fraction of primary sites and carries a distinctly worse prognosis than cutaneous disease due to anatomical constraints on achieving negative margins, multifocality, and a high propensity for regional and distant relapse [2]. In practical terms, these biological and anatomical realities translate into low survival and high failure rates, even when patients undergo definitive local therapy [1,2].

For decades, surgical strategy has been debated: abdominoperineal resection (APR) versus wide/local excision (WLE). Contemporary evidence suggests no consistent overall-survival advantage for radical surgery over organ-preserving approaches, despite potential improvements in local control with more extensive resection. Conversely, other analyses note signals that more extensive surgery could benefit carefully selected localized cases—underscoring persistent clinical equipoise and the need for context-specific data [1,3]. As systemic options have evolved, immune checkpoint inhibitors (ICI) have transformed cutaneous melanoma outcomes, but mucosal subtypes—including AM—show lower response rates and more modest survival gains, likely reflecting distinct tumor biology (e.g., lower BRAF, higher KIT alterations, different immune microenvironments) [4]. Thus, optimal combinations of surgery, radiotherapy, and systemic therapy for AM remain unsettled.

In Colombia, emerging oncologic datasets now permit survival benchmarking and determinant analysis. A national-scale survival cohort from the country's coffee-growing region (2010–2021; n=766) demonstrated lower melanoma survival than global trends, with mortality associated with age, ulceration, distant stage at diagnosis, and Breslow ≥1 mm, aligning with international determinants but highlighting late-stage presentation and structural gaps in early detection and photoprotection [5]. Complementing that broad picture, a recent single-center cohort of mucosal melanoma from Cali (2010–2019; n=23) estimated 5-year OS ≈40% across heterogeneous mucosal sites and reinforced the rarity, delayed diagnosis, and therapeutic ambiguity characteristic of mucosal disease in the Colombian setting [2]. Together, these datasets motivate a focused, real-world appraisal of AM within national cohorts.

Building on Colombia's expanding melanoma evidence base and leveraging a national database, we sought to characterize anal melanoma in Colombia through a retrospective cohort survival analysis. Our specific aims were to (i) describe clinicopathologic features and treatment patterns (surgery type, margins, radiotherapy, systemic therapy) of AM; (ii) estimate overall survival and recurrence patterns; and (iii) explore determinants of survival (stage, ulceration, margin status, treatment modality) to inform context-adapted surgical and systemic decision-making for this rare, high-risk melanoma subtype. We hypothesized that, after adjustment for stage and key pathologic factors, organ-preserving surgery would not be inferior to APR in overall survival, and that ICI use—while biologically rational—would show attenuated effectiveness compared with cutaneous melanoma benchmarks.

Methods

Study design and data source

We conducted a retrospective cohort study using a national institutional melanoma database from a high-complexity oncology network in Colombia, called Oncologos de Occidente, in Pereira, Risaralda. The registry includes all patients with histologically confirmed melanoma diagnosed between January 1, 2010 and December 31, 2021, originally used for a national survival analysis published by Flórez et al. [5].

From this total melanoma cohort (n=766), we identified all patients whose primary tumor site corresponded to the anal canal or anorectal mucosa, classified using ICD-10 codes C21.x. Anal melanoma represented 0.9% of all melanomas diagnosed during the study period. A flow diagram detailing patient selection, exclusions, and final cohort composition is shown in figure 1.

Eligibility criteria

Inclusion criteria:

- ≥18 years of age.
- Histopathologic confirmation of primary anal or anorectal mucosal melanoma.
- Availability of clinical, treatment, and follow-up data in the institutional registry.

Exclusion criteria:

- Metastatic melanoma to the anal region originating from another primary site.
- Incomplete clinical documentation preventing confirmation of primary tumor location or treatment received.

Variables and data extraction

Variables were extracted from the melanoma database and completed through detailed electronic medical record review (Table 1).

Outcomes

Primary outcome

Overall Survival (OS) — time from histologic diagnosis to death from any cause or last known follow-up.

Secondary outcomes

Recurrence pattern, need for further surgery, margin status, and diagnostic delay.

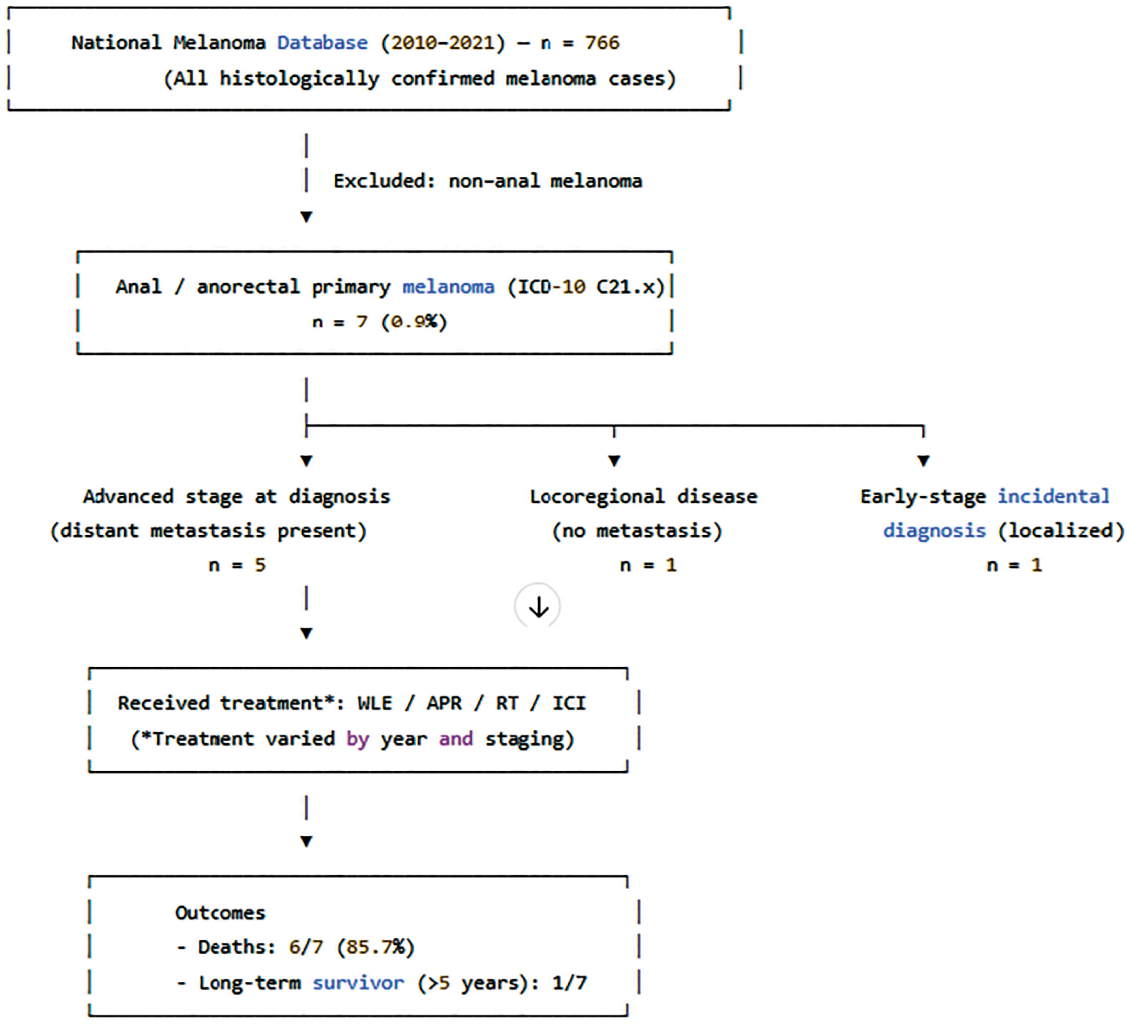


Figure 1. Study flow diagram (STROBE).

Flow diagram of patient selection from the national melanoma database (2010–2021). Anal melanoma accounted for 0.9% of all melanoma diagnoses. Most patients presented with advanced disease at diagnosis. ICD-10: International Classification of Diseases, 10th Revision; WLE: wide local excision; APR: abdominoperineal resection; RT: radiotherapy; ICI: immune checkpoint inhibitors; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology.

Source: Authors' own elaboration following STROBE guidelines.

Table 1. Domains and variables collected from the institutional melanoma registry and electronic medical records. The table summarizes the sociodemographic, clinical, pathological, treatment, and outcome variables extracted for the retrospective cohort analysis of primary anal melanoma.

Domain	Variables
Sociodemographic	Age at diagnosis, sex, referral source, insurance type.
Clinical presentation	Initial symptoms (rectal bleeding, mass, itching, pain), anorectal examination, time from symptom onset to diagnosis (diagnostic delay).
Pathology	Ulceration, mitotic rate, Breslow thickness (when reported), surgical margin status, lymphovascular invasion, sentinel lymph node biopsy.
Treatment	Type of surgery: local/wide excision vs. abdominoperineal resection (APR); radiotherapy (dose/intent); systemic therapy including immune checkpoint inhibitors (anti–PD-1 / anti–CTLA-4); chemotherapy.
Outcomes	Recurrence pattern (local, nodal, distant), date of first recurrence, date of death or last follow-up.

Source: Authors' own elaboration based on institutional melanoma registry data (2010–2021).

Statistical analysis

Categorical variables were summarized using frequencies and percentages. Continuous variables were reported as mean ± SD or median (IQR), according to distribution. Survival estimates were calculated using Kaplan–Meier curves, with comparisons using the log-rank test. Given the rarity of anal melanoma (0.9% of the cohort) and the resulting small sample size, multivariable regression modeling was not performed to avoid statistical overfitting. Statistical analyses were carried out in RStudio v4.3.1.

Results

Study population

Among 766 melanoma cases registered between 2010 and 2021 in the national institutional database, seven patients (0.9%) presented with primary anal melanoma (ICD-10 C21.x). All seven patients met the inclusion criteria and were included in the analysis. A detailed case-by-case description of demographic characteristics, clinical presentation, tumor features, treatment strategies, and outcomes is provided in table 2.

The median age at diagnosis was 61 years (IQR 54–69), and 71.4% (5/7) were women. Most patients came from low socioeconomic backgrounds and were covered by the subsidized insurance system. Obesity and active smoking were frequent findings at baseline. Three patients (42.8%) reported a family history of melanoma.

All patients initially presented with nonspecific anorectal symptoms—most commonly rectal bleeding and a sensation of a mass—frequently attributed to benign conditions such as hemorrhoidal disease. The median interval from onset of symptoms to diagnosis was 7 months (IQR 4–11 months). Two patients delayed medical consultation until severe symptoms (pain, bleeding, and anemia) developed, and both died within three months of diagnosis.

At the time of diagnosis 71.4% (5/7) already had distant metastases (liver, lung, or bone). One patient (14.3%) had locoregional lymph-node involvement without distant disease, and another patient (14.3%) was diagnosed at an early localized stage, detected incidentally.

Ulceration was present in 85.7% (6/7) of patients. Breslow thickness was reported in four cases; all measurable lesions were ≥6 mm, consistent with aggressive disease. Margin positivity after initial excision occurred in 42.8% (3/7), requiring re-excision or APR according to the surgeon's judgment.

Table 2. Individual clinicopathological characteristics, treatment, and outcomes of patients with anal melanoma.

Patient	Age	Sex	Symptoms	Tumor location	Tumor size (cm)	Ulceration	Stage at diagnosis	Surgery	Margins	Reinter-vention	Radio-therapy	Systemic therapy	ICI	Recurrence	Survival (months)	Status
1	63	F	Bleeding	Anal canal	5.2	Yes	Metastatic	WLE	Positive	Yes	Yes	Yes	Yes	Distant	6	Dead
2	59	M	Pain	Anorectal	6.0	Yes	Metastatic	APR	Negative	No	Yes	Yes	No	Systemic	4	Dead
3	67	F	Mass	Anal canal	4.8	Yes	Metastatic	WLE	Positive	Yes	Yes	Yes	Yes	Local + distant	9	Dead
4	54	F	Bleeding	Anal canal	7.1	Yes	Metastatic	Palliative	NA	No	Yes	Yes	No	Systemic	3	Dead
5	69	M	Pain	Anorectal	6.5	Yes	Metastatic	APR	Negative	No	Yes	Yes	Yes	Distant	13	Dead
6	61	F	Bleeding	Anal canal	5.0	Yes	Locoregional	WLE	Positive	Yes	Yes	Yes	No	Local	11	Dead
7	58	F	None (incidental)	Anal canal	0.4	No	Localized	WLE	Negative	No	No	No	No	None	>60	Alive

* WLE: wide local excision; APR: abdominoperineal resection; ICI: immune checkpoint inhibitors.

Detailed case-by-case description of the seven patients with primary anal melanoma included in the cohort. The table summarizes demographic features, clinical presentation, tumor characteristics, treatment strategies, and oncologic outcomes. Most patients presented with advanced-stage disease and required multimodal therapy, yet survival remained poor. The only long-term survivor (>5 years) was diagnosed incidentally at an early localized stage, highlighting the impact of early detection on prognosis.

Source: Authors' own elaboration.

Given the variability in the year of diagnosis (2010–2021) and the availability of therapeutic options, treatment strategies differed, as shown in table 3. Among patients receiving systemic therapy (n=5), grade ≥2 toxicities were documented in 80%, mainly cytopenias, mucositis, and fatigue, leading to early treatment discontinuation in two patients.

Table 3. Summary of therapeutic approaches used in patients with anal melanoma.

Treatment approach	n (%)
Wide/local excision	3 (42.8)
Abdominoperineal resection (APR)	2 (28.6)
Radiotherapy (adjuvant or palliative)	4 (57.1)
Systemic therapy (any)	5 (71.4)
Immune checkpoint inhibitors (anti-PD-1 / CTLA-4)	3 (42.8)

Source: Authors' own elaboration based on institutional melanoma registry data (2010–2021).

At final follow-up 6 of 7 patients (85.7%) had died (Table 4). The median overall survival from diagnosis was 9.4 months (IQR 3.1–13.2). Only one patient (14.3%) survived beyond 5 years and was the only case diagnosed at an early stage, discovered incidentally during evaluation for another condition. Patients diagnosed at an advanced stage (with distant metastasis) had a median survival of 4.2 months. Time from diagnosis to death in the two latest cases was 3 months or less, reflecting the aggressive nature of the disease and the impact of diagnostic delay. Figure 2 shows the Kaplan–Meier overall survival curve, highlighting the extremely poor prognosis and the single long-term survivor diagnosed at an early stage.

Documentation in medical records revealed significant psychological distress across all patients, expressed as fear, hopelessness, and anxiety regarding body image and prognosis. Several required expedited referrals to

Table 4. Comparison of clinical and treatment characteristics between the long-term survivor and the patients who died.

Variable	Long-term survivor (n=1)	Non-survivors (n=6)
Age at diagnosis (years)	58	Median 62 (IQR 55–71)
Sex	Female	4 Female / 2 Male
Socioeconomic status	Middle	Low / subsidized insurance majority
Comorbidities	None relevant reported	Obesity and/or smoking frequent
Family history of melanoma	No	3 patients (50% of those with available data)
Clinical presentation	Incidental inding (asymptomatic)	Symptomatic anorectal bleeding, mass, pain
Time from symptom onset to diagnosis	0 months (incidental)	Median 7 months (IQR 4–11 months)
Stage at diagnosis	Localized	Metastatic at presentation in 5/6 (83.3%)
Ulceration on pathology	No	Present in 6/6 with available data
Breslow thickness (mm)	≤ 4 mm (reported)	≥ 6 mm in all measurable lesions
Surgical management	Local/wide excision	Wide excision [3], APR [2], palliative procedures [1]
Radiotherapy	No	4/6 received RT (adjuvant or palliative)
Systemic therapy	No	5/6 received systemic therapy
Immunotherapy (ICI)	No	3/6 received ICI (anti-PD-1 or CTLA-4)
Treatment-related toxicity	Not applicable	Grade ≥2 toxicity in 80%, early treatment discontinuation in 2 patients
Overall survival	> 60 months (alive at 5 years)	Median 4.2 months (range 1–13 months)
Cause of death	Alive / no evidence of disease	Disease progression in all cases

Comparison of demographic, clinicopathologic, and treatment characteristics between the only long-term survivor (>5 years) and the six patients who died during follow-up. Early, incidental diagnosis was the only case detected before metastatic progression, allowing organ-preserving surgery and long-term survival. Most non-survivors had diagnostic delay, advanced-stage presentation, aggressive pathological features, and multimodal therapy exposure without survival benefit.

Source: Authors' own elaboration based on institutional melanoma registry data (2010–2021).

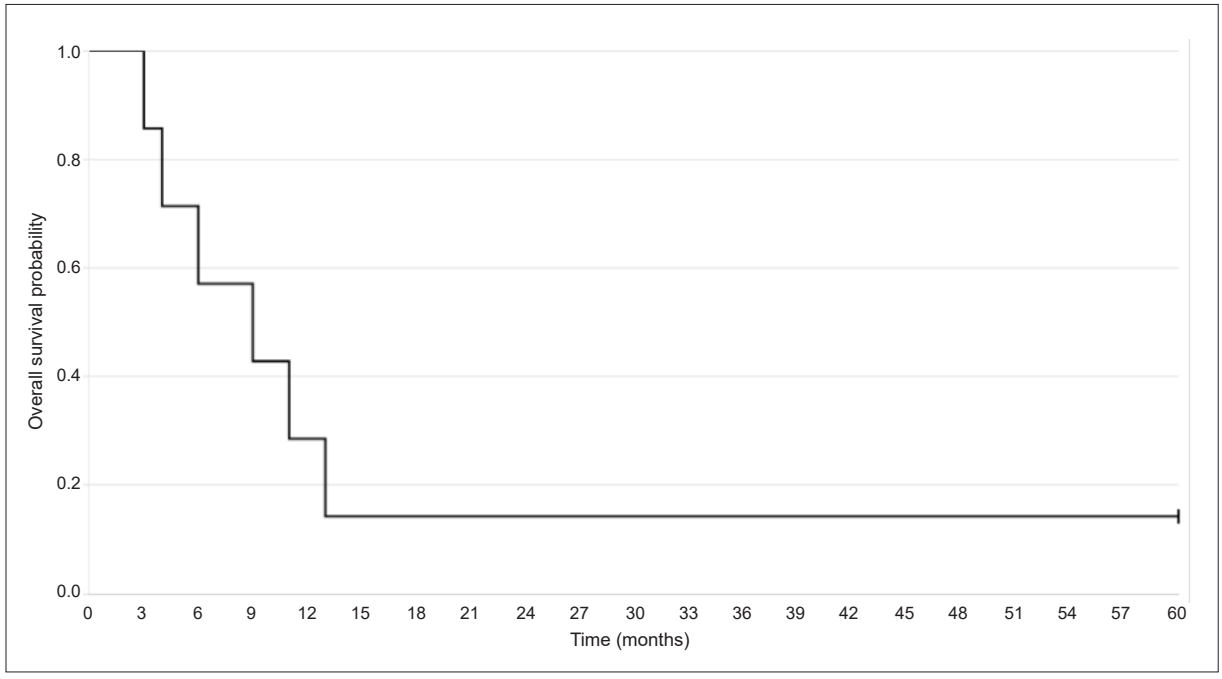


Figure 2. Kaplan–Meier overall survival curve.

Kaplan–Meier overall survival curve for patients with anal melanoma (n=7). Median overall survival was 9.4 months. The curve shows a marked early decline in survival, followed by a final plateau at 14.3%, corresponding to the only patient alive at last follow-up. Tick marks indicate censored observations. The table below the x-axis shows the number of patients at risk at selected time points.

Source: Authors' own survival analysis using RStudio v4.3.1 from institutional melanoma registry data.

mental health services. Psychological reports documented feelings of fear, disfigurement, and hopelessness in all patients; two explicitly refused further treatment prior to death due to emotional exhaustion.

Discussion

Anal melanoma (AM) is a rare but highly aggressive melanoma subtype, representing less than 2% of all melanomas worldwide and consistently demonstrating the worst survival outcomes among mucosal melanomas [6,7]. In this national real-world cohort from Colombia, AM represented only 0.9% of all melanoma cases, yet carried extremely poor survival, with six of seven patients dying during follow-up despite multimodal treatment. The only patient achieving >5-year survival was the only individual diagnosed incidentally at an early stage, underscoring the critical influence of early detection and stage at diagnosis.

International studies report median overall survival ranging from 7 to 12 months and 5-year survival consistently below 20% [6-9]. Our findings are fully concordant with these observations: the median OS among patients diagnosed with metastatic disease in our cohort was 4.2 months, and only one patient survived beyond 5 years.

Delayed diagnosis is a recurring global feature of AM. Patients often present with nonspecific anorectal symptoms, such as bleeding or pain, which are frequently misattributed to benign anorectal conditions—most commonly hemorrhoidal disease [10,11]. This diagnostic delay was clearly reflected in our cohort, where the median time to diagnosis was 7 months, and two patients died within three months of diagnosis after presenting extremely late.

Surgical management remains controversial worldwide. Multiple systematic reviews and SEER-based analyses demonstrate no overall survival benefit of abdominoperineal resection (APR) compared with local or wide excision (WLE) [8,9,12,13]. APR may improve local control but does so at the cost of higher morbidity, while WLE preserves continence without demonstrating superior survival. Our data mirror this equipoise: patients underwent WLE, APR, or mixed approaches depending on disease stage and year of diagnosis, but treatment intensity did not reverse lethality once metastatic disease was present.

The introduction of immune checkpoint inhibitors (ICI) revolutionized cutaneous melanoma management, yet mucosal melanoma demonstrates markedly lower response rates, owing to distinct genomic and immunologic profiles (lower mutational burden, higher KIT alterations, and a distinct tumor microenvironment) [12-14]. In our cohort, patients receiving systemic therapy—including ICI—experienced frequent toxicities and disease progression, consistent with published mucosal melanoma real-world outcomes.

Colombia has recently begun generating population-level melanoma data. The national melanoma cohort by Flórez et al. demonstrated lower survival compared with global benchmarks, driven by late presentation and structural access barriers [5]. Our AM subanalysis reinforces these findings at the most extreme end of melanoma aggressiveness. Most patients in our study belonged to low socioeconomic backgrounds, often with delayed access to specialist care, supporting the notion that structural inequities amplify diagnostic delay.

These findings are particularly relevant for coloproctology: AM appears rarely, but when missed, it is almost universally fatal.

The only long-term survivor in this study was diagnosed incidentally and early, before metastasis. There is no screening test for AM. However, melanoma survivors are a well-defined high-risk group, with studies showing a significantly increased risk of developing a second primary melanoma even 10–15 years after the first [15-17].

Survivors of melanoma—cutaneous or mucosal—should receive long-term surveillance, including prompt anoscopic evaluation when anorectal symptoms appear. Raising awareness among primary care providers and colorectal surgeons may create the only feasible screening mechanism: vigilant, symptom-triggered assessment.

All patients experienced a profound psychological impact. Treatment toxicities (chemotherapy and ICI) were frequent—grade ≥2 in 80% of those receiving systemic therapy—sometimes leading to discontinuation. Given the typically rapid clinical decline, early integration of palliative and psycho-oncological support is essential, aligning with international recommendations for advanced AM management [8,18].

Strengths include the use of a national institutional melanoma database, detailed clinical and survival follow-up, and analysis of real-world therapeutic trajectories across a 12-year period.

Limitations are inherent to AM rarity (small sample size) and temporal treatment variability (introduction of ICI over the study period). Despite this, the dominant signal across all data sources—ours and international—is unequivocal: stage at diagnosis defines survival, not treatment intensity.

Clinical implications

Although anal melanoma represents an exceptionally uncommon diagnosis in routine colorectal practice, its rarity should not translate into clinical invisibility. The disproportionate mortality observed in this cohort emphasizes the importance of considering malignant melanoma within the differential diagnosis of atypical, persistent, or treatment-refractory anorectal lesions. For colorectal surgeons and other clinicians evaluating anorectal disease, recognition of unusual pigmentation, ulceration, nodularity, or an unexplained mass should prompt histopathological assessment rather than prolonged empirical management as benign disease. In this setting, clinical awareness has particular value because overlooking a rare diagnosis may have substantial consequences for subsequent therapeutic options and patient outcomes.

Conclusion

Anal melanoma is exceedingly rare but almost universally lethal. In this national retrospective cohort from Colombia, most patients presented with advanced disease due to delayed recognition of nonspecific anorectal symptoms and socioeconomic barriers to timely evaluation. Treatment intensity—including surgery, radiotherapy, and immunotherapy—did not overcome the poor prognosis once metastasis was present. The only long-term survivor was diagnosed incidentally at an early stage, underscoring that early detection—not treatment aggressiveness—is the determinant of survival.

Clinicians should maintain a high index of suspicion, particularly in patients with a personal history of melanoma, who represent a high-risk population. Prompt anorectal examination and biopsy of any persistent anorectal symptom may be the only opportunity to change the natural history of this disease. For colorectal and surgical oncology practice:

> *Any persistent anorectal symptoms (bleeding, mass, pruritus, pain) in a current or former melanoma patient must trigger immediate anoscopic assessment and biopsy.*

Compliance with ethical standards

Informed consent: The study was approved by the Institutional Research and Ethics Committee. Because the study used secondary anonymized data, informed consent was waived in accordance with national regulations and the Declaration of Helsinki. This manuscript adheres to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cohort studies.

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Author's contributions:

- Study design and conception: Milián Berrio, Arias Flórez.
- Data acquisition: Milián Berrio, Arias Flórez, Aguirre Flórez.
- Data analysis and interpretation: Milián Berrio, Arias Flórez, Aguirre Flórez.
- Manuscript drafting: Milián Berrio, Aguirre Flórez, Gómez González.
- Critical review and final approval: Moreno Gómez, Figueroa Avendaño.

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