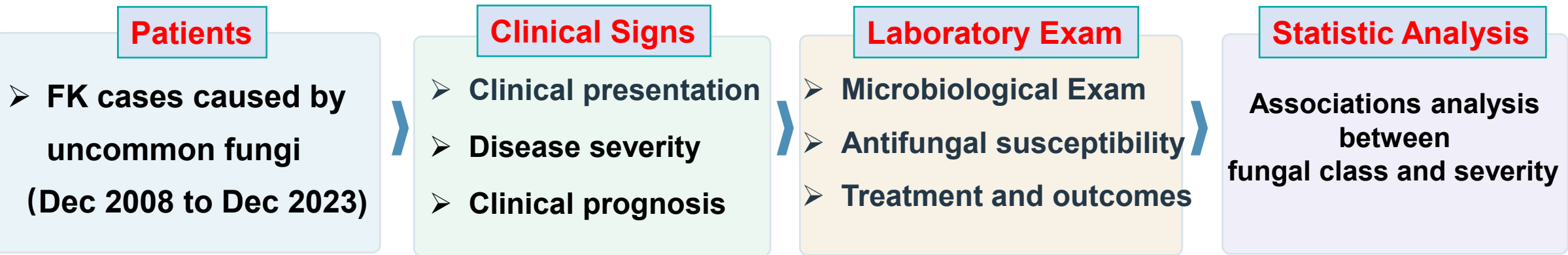


Background & Aim

- Fungal keratitis (FK) is commonly caused by *Fusarium*, *Aspergillus*, *Alternaria* and *Candida* species.
- Infections caused by uncommon fungal pathogens remain insufficiently defined in terms of clinical behavior and therapeutic burden.
- We characterize the clinical presentation, microbiological spectrum, and treatment course of uncommon FK.

Methods

➤ Retrospective longitudinal study



- Time to lesion inactivity, defined as the duration of antifungal treatment, was estimated using Kaplan–Meier analysis.
- Group comparisons were performed using two-tailed log-rank tests, with median survival times reported.

Demographics and predisposing factors

- Sixty-three patients with culture-proven uncommon fungal keratitis treated between 2008 and 2023 were included in the analysis.
- A clear male predominance, with 44 men (69.8%), and a mean age of 56.1 ± 9.8 years.
- The interval between symptom onset and hospital presentation with a mean duration of 31.1 ± 24.8 days

Table 1. Patient Demographics and Epidemiological Patterns of Uncommon Fungal Keratitis.

Parameters	Dothideomycetes (n=14)	Sordariomycetes (n=31)	Eurotiomycetes (n=12)	Others (n=6)	P value
Male	11 (78.6)	21 (67.7)	8 (66.7)	4 (66.7)	0.821
Age (Mean ± SD)	56.3 ± 9.9	55.4 ± 9.5	60.3 ± 9.0	51.0 ± 12.1	0.387
Risk factors					
Trauma	9 (64.3)	20 (64.5)	9 (75.0)	4 (66.7)	0.042*
Ocular Surgery	2 (14.3)	1 (3.2)	0 (0)	1 (16.7)	
Ocular Disease	0 (0)	1 (3.2)	0 (0)	0 (0)	
Denial	3 (21.4)	9 (29.0)	3 (25.0)	1 (16.7)	
Season of infect					
Spring	1 (7.1)	9 (29.0)	4 (33.3)	1 (16.7)	0.179
Summer	1 (7.1)	4 (12.9)	2 (16.7)	0 (0.0)	
Autumn	9 (64.3)	10 (32.3)	4 (33.3)	3 (50.0)	
Winter	3 (21.4)	8 (25.8)	2 (16.7)	2 (33.3)	
Presentation time	18.3 ± 18.7	34.5 ± 23.2	44.2 ± 35.2	31.4 ± 26.8	0.028*

- 33 patients (52.4%) were treated with medical therapy alone, 11 patients (17.5%) required surgical intervention.
- A detailed summary of class-specific demographics, risk factors, seasonal patterns, and treatment modalities is provided in Table 1.

Clinical characteristics

- All patients reported hallmark symptoms of corneal irritation, reduced visual acuity, conjunctival hyperemia, and discharge.
- On slit-lamp examination, moderate-sized corneal ulcers (2–5 mm) predominated, accounting for 55.6% of cases.
- Dense infiltrates were particularly frequent among Sordariomycetes infections (65.5%).

Severity profiles and accompanying clinical features of different fungal class

- Eurotiomycetes infections had the longest median treatment duration (242.5 days; IQR, 197–272), accounting for 27.3% of surgical cases.
- These infections are more frequently presented with large ulcers (>5 mm, 50.0%), multifocal involvement (66.7%, $P = 0.001$), corneal neovascularization (58.3%, $P = 0.035$), and hypopyon (50.0%).

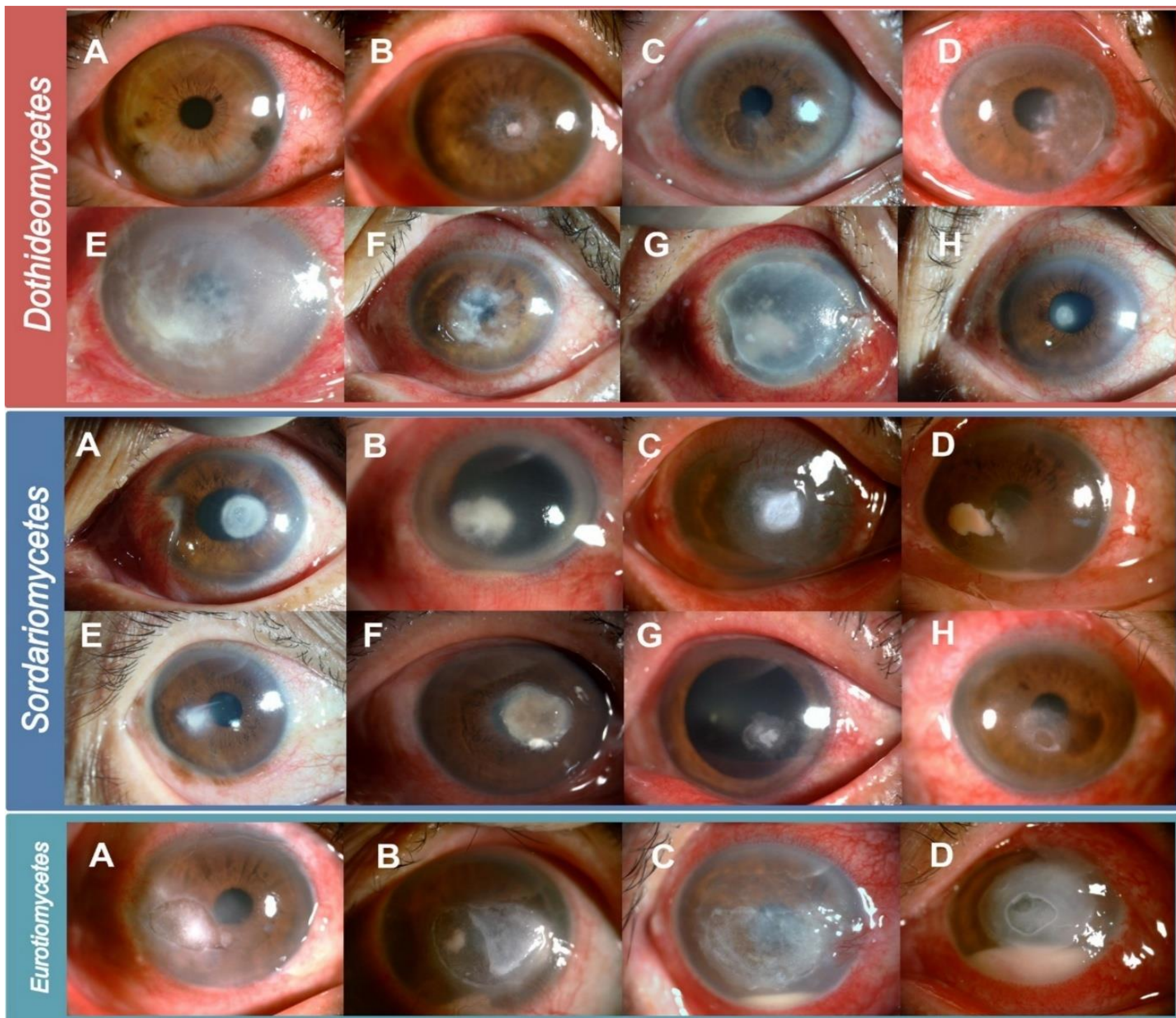


Figure 1. Slit-lamp images showing class-specific patterns in uncommon FK. Dothideomycetes: (A) *Aureobasidium* sp., (B) *Exserohilum* sp., (C–E) *Bipolaris* sp., (F) *Cladosporium* sp., (G) *Curvularia* sp., (H) *Phoma* sp. Sordariomycetes: (I) *Purpureocillium lilacinum*, (J) *Chaetomium* sp., (K–M) *Acremonium* sp., (N) *Beauveria* sp., (O) *Scedosporium* sp., (P) *Colletotrichum* sp. Eurotiomycetes: (Q) *Microsporium* sp., (R–S) *Penicillium* sp., (T) *Exophiala* sp.

The colony, microscopic, and in vivo morphological features of uncommon fungi

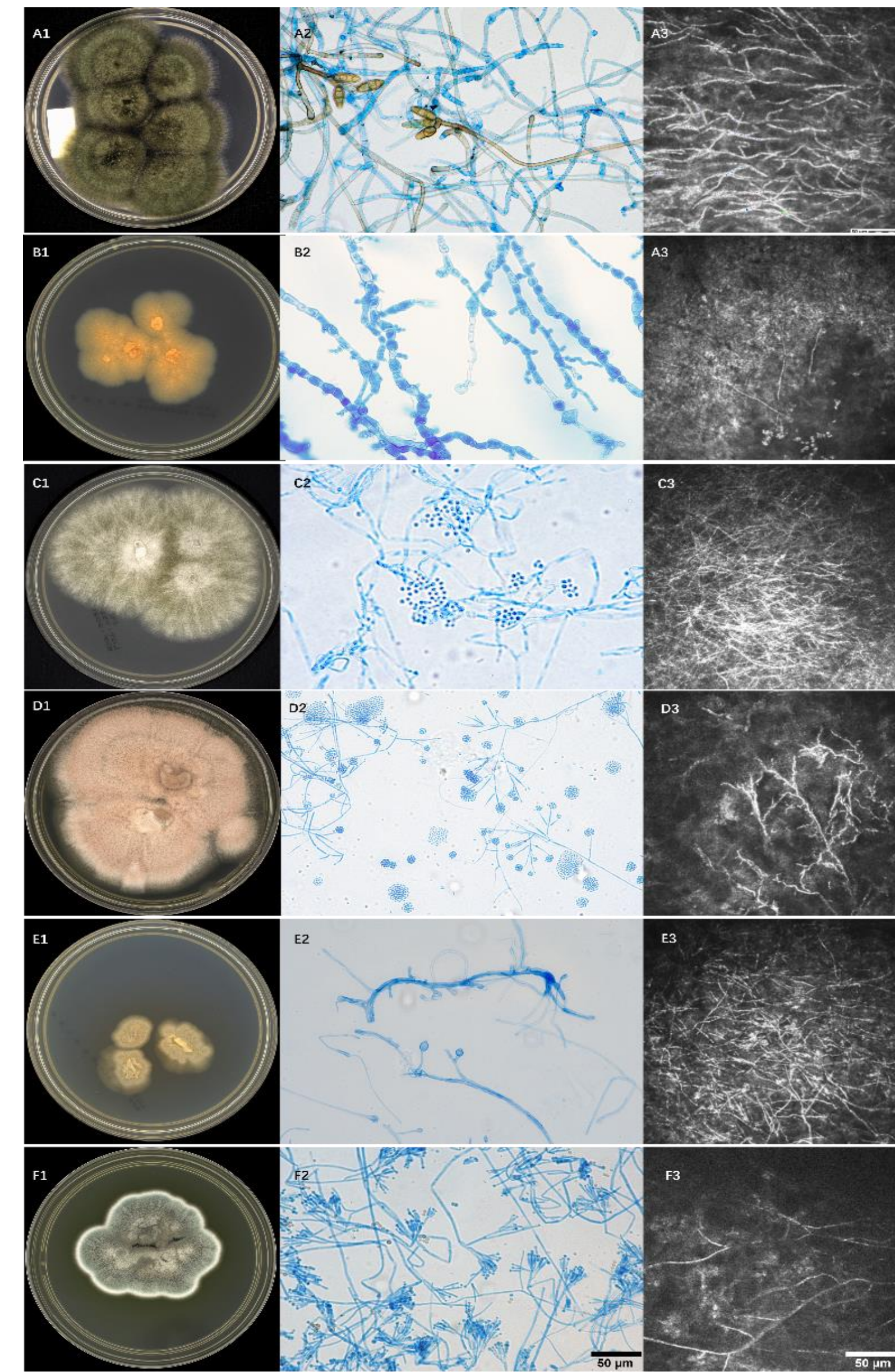


Figure 2. Integrated colony, microscopic, and in vivo morphology of uncommon fungal keratitis isolates. Representative images of colony morphology (1), Lactophenol Cotton Blue–stained microscopic structures (2), and corresponding in vivo confocal microscopy (IVCM) images, (3) for each species. Dothideomycetes: *Curvularia* (A1–A3), *Phoma* (B1–B3); Sordariomycetes: *Acremonium* (C1–C3), *Purpureocillium lilacinum* (D1–D3); Eurotiomycetes: *Exophiala* (E1–E3), *Penicillium* (F1–F3)..

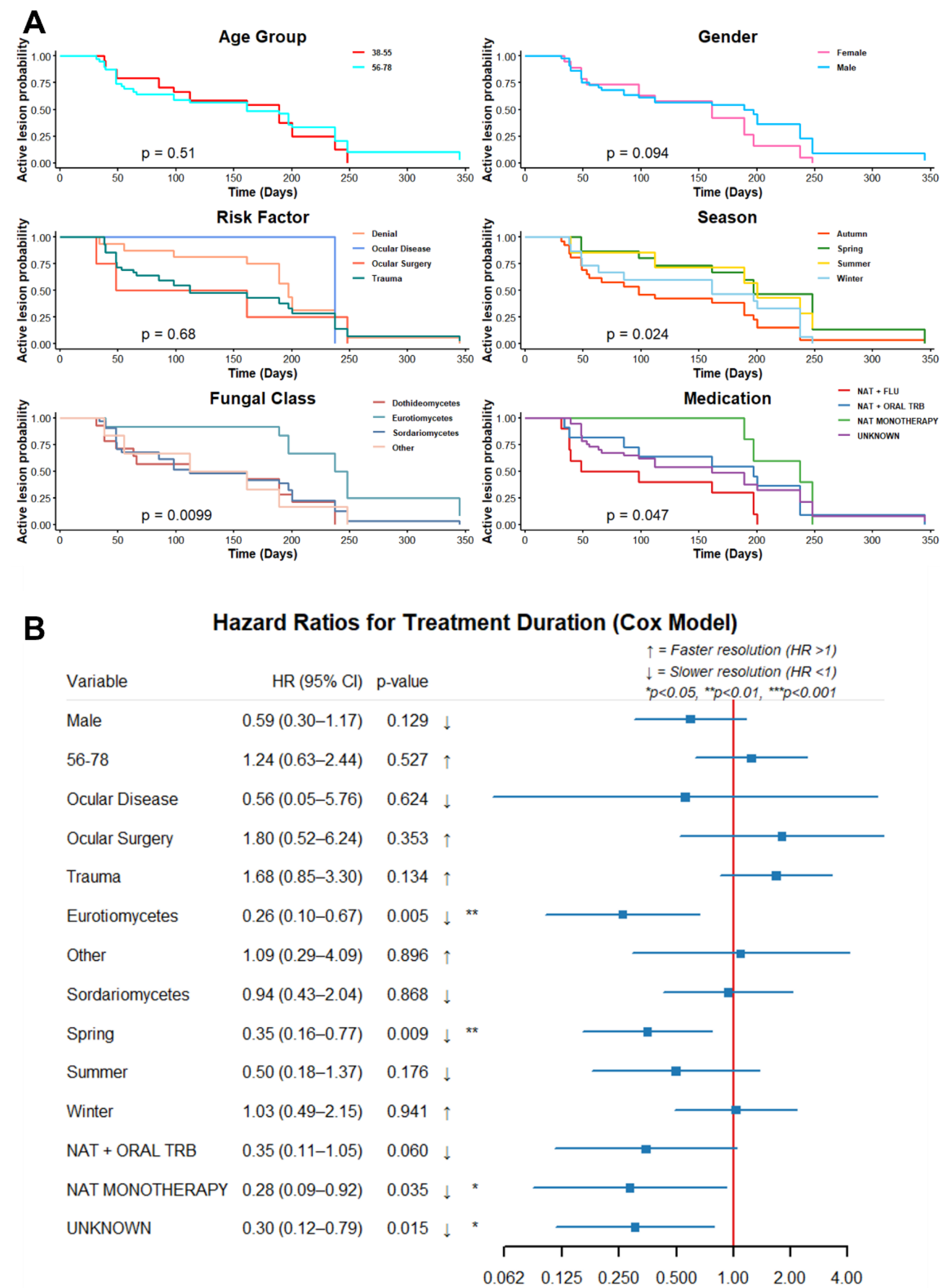


Figure 3. Treatment outcomes analysis in uncommon FK. (A) Kaplan-Meier analysis of treatment duration stratified by age, gender, risk factors, seasonal onset, fungal class, and medication. Significant differences were observed across fungal classes and seasons (log-rank $P < 0.05$). (B) Multivariable Cox proportional hazards analysis of factors associated with time to resolution.

Conclusions

- Uncommon fungal infections in FK are associated with severe corneal involvement, and prolonged treatment courses.
- Class-specific differences in disease severity highlight the clinical value of early recognition and precise microbiological identification.
- Natamycin combination with fluconazole yielded the shortest median recovery.
- Eurotiomycetes infections and summer-onset cases representing high-risk scenarios that may necessitate combined treatments and close monitoring.