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Therapeutic management of *Knemidocoptes pilae* infestation in budgerigars (*Melopsittacus undulatus*): Case Reports

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Abstract

This report describes cases of *Knemidocoptes pilae* infestation in budgerigars (*Melopsittacus undulatus*). The mites produced scaly lesions primarily on the face and legs and were diagnosed through clinical signs and microscopic examination of skin scrapings. Severity of lesions and the general physical condition were strongly correlated to the interval between disease onset and the time of clinical intervention. Management included beak trimming (where appropriate), topical ivermectin, and a supplemental botanical acaricidal treatment. All affected birds demonstrated progressive clinical resolution over the course of therapy, providing support for an integrated protocol that combines conventional and natural acaricidal approaches for avian knemidocoptiasis.

Keywords: *Melopsittacus undulatus*, *Knemidocoptes pilae*, scaly face mite, overgrown beak, scissor beak

1. Introduction

Budgerigars (*Melopsittacus undulatus*) are small old world parrots indigenous to the scrublands of Australia. They have been bred in captivity since the mid-19th century and are popular worldwide as pets due to their sociability, bright plumage, and relatively low cost ^[1, 2]. In captivity, budgerigars may develop a wide range of infectious and non-infectious ailments, including beak malformations such as an overgrown or scissor beak ^[1]. A normal, healthy beak exhibits smooth texture, symmetrical shape, and appropriate alignment of upper and lower mandibles ^[3].

Among conditions affecting the avian beak, *Knemidocoptes pilae* (the scaly face mite) is a significant ectoparasite that causes hyperkeratotic lesions on featherless areas of the head, cere, eyelids, and legs, frequently accompanied by beak deformities ^[4, 5]. In budgerigars, knemidocoptiasis may remain latent until stressors such as overcrowding, poor hygiene, or changes in environment permit clinical expression of disease ^[6, 7]. This case series reports the therapeutic use of topical ivermectin in combination with a botanical acaricidal for knemidocoptiasis and describes concurrent beak-trimming interventions.

2. Case Reports

2.1 Case 1

A pair of budgerigars was purchased from a local pet shop and housed with a larger flock. The male bird had a blue cere, while the female had a brown cere ^[3]. The female showed a twisted, overgrown beak with dark discolouration and extensive hyperkeratotic lesions around the cere and eyes, alongside sporadic feather-ruffling (Figure 1, 2). Anatomical distortion of the cere and abnormal beak length suggested an advanced, chronic process.

2.2 Case 2

A single female budgerigar presented with an overgrown upper and lower mandible. Clinical examination revealed marked hyperkeratosis, crusty lesions at the base of the beak, and a scissor beak alignment.

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The owner noted this had begun approximately three months prior to veterinary evaluation, with the bird's body condition somewhat reduced; it drank water by tilting its head sideways at the rim of the water bowl.



Fig 1, 2: Overgrown beak

2.3 Case 3

An entire flock of six budgerigars from a local pet shop presented with crusty lesions on both legs, hyperpigmentation, overgrown nails, persistent itching, and decreased perching ability (Figure 3). The birds were spending more time at the cage floor and exhibited inappetence. Husbandry conditions were suboptimal: the cage was unclean, with poor hygiene likely exacerbating the spread and clinical severity of mite infestation.

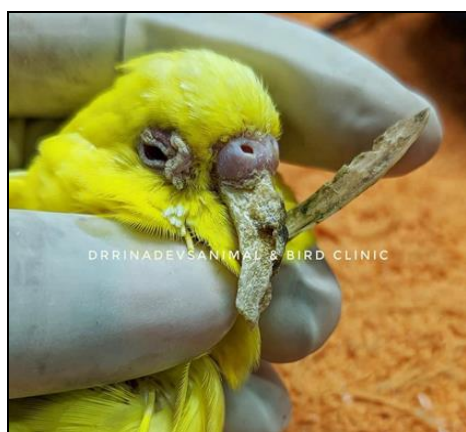


Fig 3: Scissor beak, hyperkeratosis around eyelids and beak

3. Diagnosis

Based on pathognomonic facial and pedal lesions [4, 5], skin scrapings were taken from crusted areas around the cere, eyes, and legs. Microscopic examination demonstrated motile mites consistent with *Knemidocoptes pilae*, characterised by round bodies and short legs that barely protruded from the body margin [6] (Figure 4). This diagnostic finding confirmed knemidocoptiasis [7].



Fig 4: Microscopic image of *Knemidocoptes pilae* from the skin scraping

4. Therapeutic Management

4.1 Physical Restraint and Beak Trimming

All birds were restrained using the gentle Ringer's hold technique to reduce stress. Overgrown beaks were trimmed and shaped using an ultrasonic diamond blade trimmer, carefully avoiding the underlying vascularised tissue (Figure 5, 6). This restored partial functional alignment, although birds with chronic deformities remained prone to future beak overgrowth.



Fig 5: Beak trimmed to appropriate length avoiding vascular parts



Fig 6: Beak trimmed to appropriate length avoiding vascular parts

4.2 Pharmacological Treatment

Each budgerigar, weighing approximately 25-35 g, received topical ivermectin (Hitek®) at 0.2 mg/kg body weight on the dorsal midline between the wings. This was administered once weekly for four consecutive weeks (8, 9). Additionally, an herbal acaricidal preparation (Mite-o-kill spray*) was applied every other day for 15 treatments (or until lesions visibly regressed), with further "as-needed" administration if pruritus persisted.

For the female yellow budgerigar, a diluted avian insect liquidator** was sprayed over the body as an adjunct. Symptomatic relief and progressive reduction in lesions typically appeared by the second or third week (similar to findings by 9, 10).

4.3 Supportive and Environmental Measures

Improved husbandry was strongly recommended, including routine cage cleaning, proper ventilation, and environmental enrichment to reduce stress [2]. Advising owners to monitor beak length and general health facilitated earlier recognition of recurrences or secondary issues.

5. Results

Within two to three weeks, all birds demonstrated noticeable reduction in hyperkeratotic lesions (Figure 7). Overgrown beaks grew at a slower rate, and activity levels improved. By the third ivermectin application, scaly facial and pedal lesions had mostly resolved, echoing observations from similar protocols [7, 9]. One bird (Case 1) exhibited permanent structural changes at the cere base, requiring periodic beak trimming to prevent excessive overgrowth. Another bird's scissor beak also necessitated ongoing maintenance due to malocclusion.

No major adverse effects from ivermectin were noted at the applied dosage, supporting its established safety profile in budgerigars [7, 8].



Fig 7: Reduction in lesions around the eyes and beak by week four

6. Discussion

Scaly face and leg disease due to *Knemidocoptes pilae* remains a prevalent ectoparasitic condition in budgerigars [4, 5]. Mites induce hyperkeratotic, orthokeratotic lesions and can cause severe beak distortion if untreated [6, 11]. The onset of clinical signs can be influenced by stress (e.g., transport, poor hygiene, or overcrowding), allowing dormant mites to proliferate [7, 12].

Topical ivermectin at 0.2 mg/kg is considered a cornerstone therapy for avian knemidocoptiasis due to its high efficacy and relatively favourable safety margin [7, 8]. However, repeated application is often required to eradicate mites at different life stages, and overdose risk must be managed [13]. In this report, concurrent use of a natural acaricidal spray containing botanical extracts (e.g., neem, geranium) aided symptomatic relief and may help mitigate resistance to synthetic acaricides [10, 14].

Severe chronic lesions occasionally result in permanent deformities, as noted in one of the presented birds [15]. In such cases, regular beak trimming and supportive care are necessary to maintain proper feeding and quality of life [1]. Tissue biopsy could help elucidate underlying keratoacanthomas or other pathological changes but often

poses risks in small parrots, including hypovolaemia and stress [15].

7. Conclusion

This case series highlights the successful management of scaly face and leg disease in budgerigars (*Melopsittacus undulatus*) using topical ivermectin and botanical acaricides, combined with beak trimming to address deformities. Prompt diagnosis, appropriate parasitic control, and improved husbandry can facilitate rapid recovery and prevent complications. When chronic structural beak changes occur, periodic monitoring and beak maintenance are imperative to preserve function and well-being. Further research on combining synthetic and natural acaricides and the potential for long-term resistance reduction would help refine knemidocoptiasis treatment in avian species.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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