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Case Report

Diagnostic imaging of foot mycetomas: A report on two cases [☆]

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ABSTRACT

Mycetomas caused by aerobic actinomycetes are called actinomycetomas. It is primarily localized in subcutaneous tissue but it can spread to different tissue planes including the skin, deep tissues and structures and eventually the bones. We report the cases of 2 patients referred for evaluation of soft tissue masses involving the foot. A 40-year-old male and a 25-year-old male, in both cases MRI was performed to assess the extension, which was later completed by a CT scan. MRI revealed a low intensity matrix that represents fibrosis containing multiple high intensity lesions corresponding to the mycetoma grains. Within some of the lesions a low-intensity focus was identified. This "dot-in-circle sign" on an MRI is a pathognomonic feature of mycetoma. The purpose of this work is to describe the characteristic MRI appearance of foot mycetoma.

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Introduction

Mycetoma is a chronic granulomatous inflammatory disease of cutaneous and subcutaneous tissue that can be caused by both bacteria (actinomycetomas) and fungi (eumycetomas). Initially, it starts as a localized swelling, but it can disseminate to different tissue planes by invading the skin, deep structures and eventually the bones. This paper describes the MRI features of mycetomas as well as the role of imaging in determining the extent of the lesions as an early and accurate diagnosis

is mandatory to prevent functional and esthetical impairments.

1st Case report

A 40-year-old male, taxi driver, nondiabetic and non-immunocompromised, consulted for swelling of the left foot with watery and blackish granule discharge of 10 years' duration. He underwent biopsy and the histopathology showed

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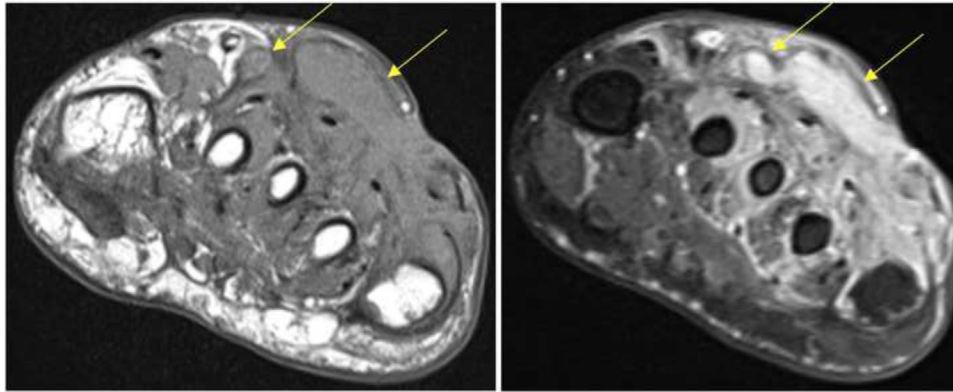


Fig. 1 – Case 1. Axial MRI sections in regular T1 (A) and fat-suppressed T1 weighting after intravenous injection of gadolinium (B), showing several round-to oval-shaped isointense lesions involving the subcutaneous tissue of the dorsum of the foot, enhanced after gadolinium injection, with peripheral low-signal-intensity fibrosis in between, corresponding to mycetoma grains.

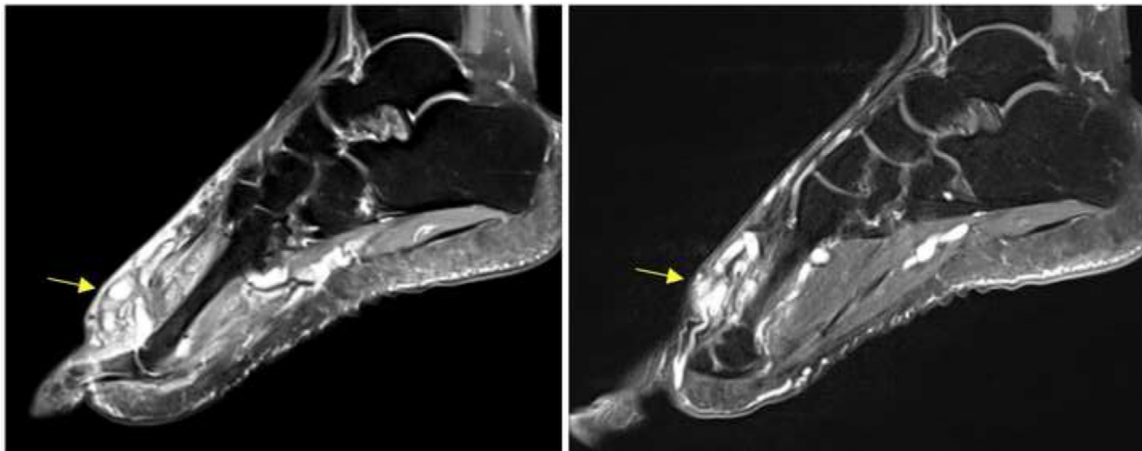


Fig. 2 – Case 1. Sagittal MRI sections in data proton weighting (A) and fat-suppressed T1 weighting after gadolinium injection (B), showing the previously described mycetoma grains, with infiltration of the adjacent muscles, and intermuscular fascial planes.

filamentous bacteria of actinomycetes. Plain radiograph revealed a soft tissue mass in the dorsum of the foot with no sign of osteomyelitis. Ultrasonography revealed a central hyperreflective echoic area delimited by hypo reflective echoic tissue; Doppler image showed increased vascularity. The MR findings were most clearly seen on the T2-weighted, STIR sequences, as well as fat-suppressed T1-weighted sequence after injection of intravenous gadolinium. Images showed multiple millimetric round- to oval-shaped hyperintense lesions involving the subcutaneous tissue of the dorsum of the foot with peripheral low-signal-intensity fibrosis in between, corresponding to mycetoma grains (Figs. 1–2). A central hypointense dot was observed within some of them making the characteristic “dot in a circle sign” (Fig. 3). It also revealed an infiltration of the adjacent muscles, and intermuscular fascial planes at the affected location. T2-weighted fat saturated

and T1-weighted fat saturated postcontrast images depicted effusion of the 3rd, 4th and 5th metatarsophalangeal joints as well as synovial thickening. There was no sign of osteomyelitis on the radiograph (Fig. 4) and CT scan. Biopsy and bacterial screening confirmed the presence of actinomycosis. The patient required prolonged anti-infective therapy along with close surveillance.

2nd Case report

A 25-year-old male farmer, without any significant medical history. Presented with a painless soft tissue mass of the left foot that had been present for the past 3 years. This mass had progressively extended and became swollen, slightly painful

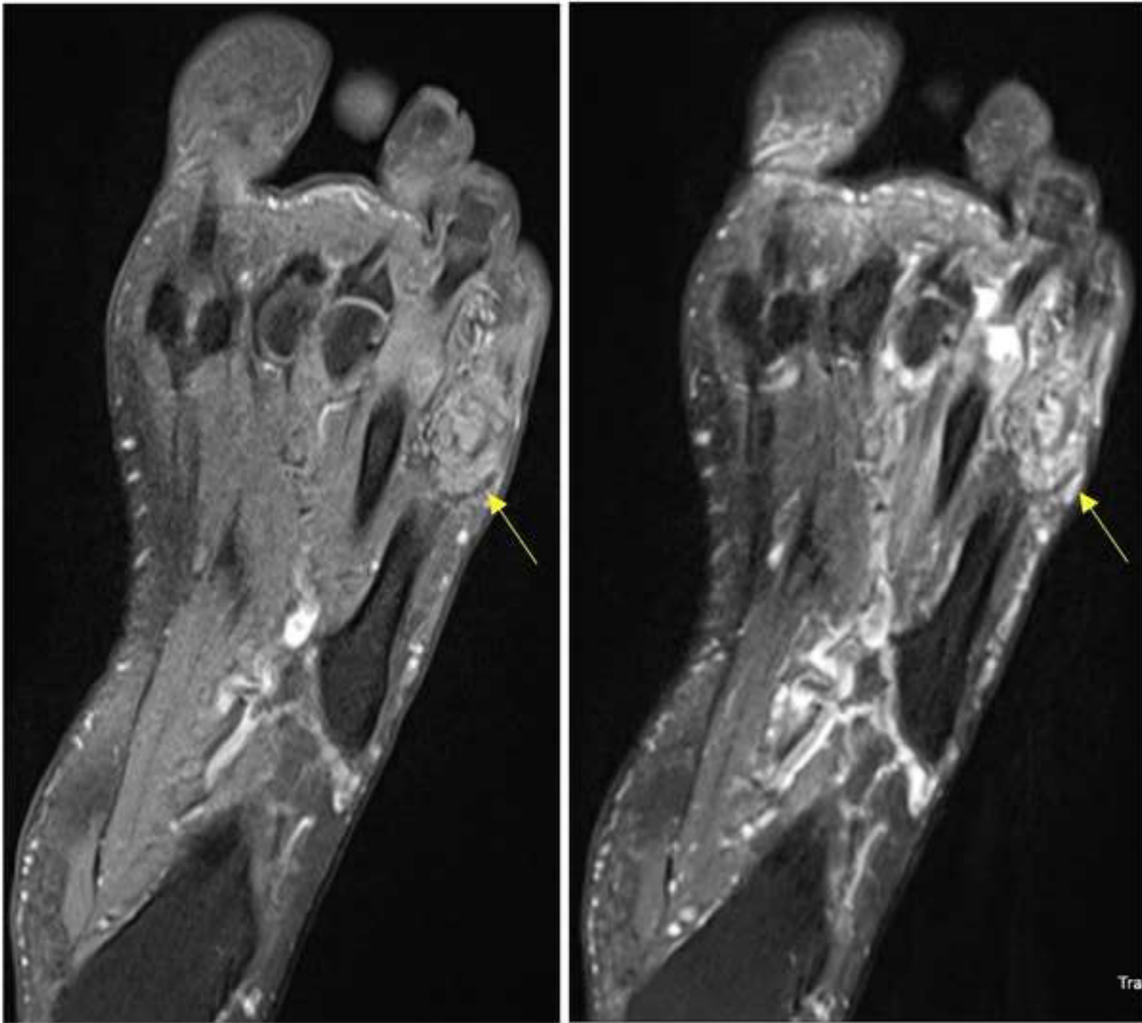


Fig. 3 – Case 1. Coronal MRI sections in fat-suppressed T1 (A) and fat-suppressed proton data weighting (B), showing iso- to hyperintense lesions corresponding to mycetoma grains, 1 of them having a central hypointense dot, making the characteristic “dot in a circle sign”. Note also effusion of the 3rd, 4th and 5th metatarsophalangeal joints as well as synovial thickening.

and polyfistulised with discharge of white granules. Ultrasonography showed echogenic nodules with a hypoechoic halo as well as an infiltration of the subcutaneous tissue. The MR images show multiple small round-to spherical hyperintense lesions separated by peripheral hypointense tissue over the dorsal and plantar aspects of the left foot, some of the lesions contained a central hypointense dot. After injection of gadolinium, we note an enhancement of the lesions. Effusion of the 4 last metatarsophalangeal joints and Infiltration of the plantar fascia and adjacent muscles were noted as well. Marrow edema was present in the cuboid as well as the 4th and 5th metatarsal bones which indicates the presence of osteomyelitis (Figs. 5–7). This was later confirmed by a CT scan (Fig. 8). The patient underwent an excision biopsy and bacterial screening confirming the presence of actinomycosis (Fig. 9). In this case the treatment was more aggressive and radical (amputation).

Discussion

Mycetoma is an inflammatory chronic granulomatous of the subcutaneous tissue that can be caused by true fungi or filamentous bacteria. These organisms are present in the soil and may enter the subcutaneous tissue by traumatic inoculation [1]. The lesions develop sinuses from which there is a discharge of colored granules containing fungal or bacterial colonies.

Medical imaging is indispensable in the evaluation of the extension, bone involvement in particular. Without treatment,



Fig. 4 – Case 1. Lateral view of foot's radiograph in case 1 shows insignificant thickening of soft tissues without signs of osteomyelitis. Note an artifact of compresses.

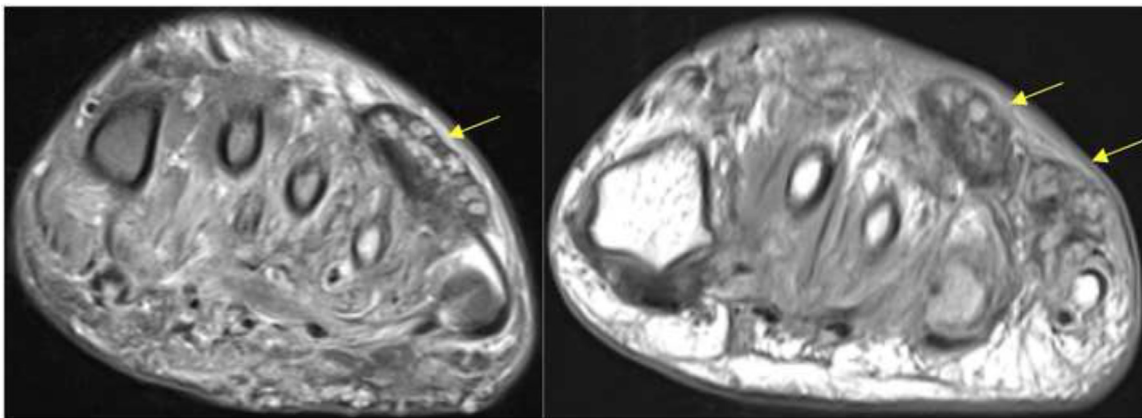


Fig. 5 – Case 2. Axial MRI sections in proton data (A) and T1 weighting (B), showing multiple round- to oval-shaped iso- to hyperintense lesions involving the subcutaneous tissue of the dorsum of the foot, with peripheral low-signal-intensity fibrosis in between, corresponding to mycetoma grains.

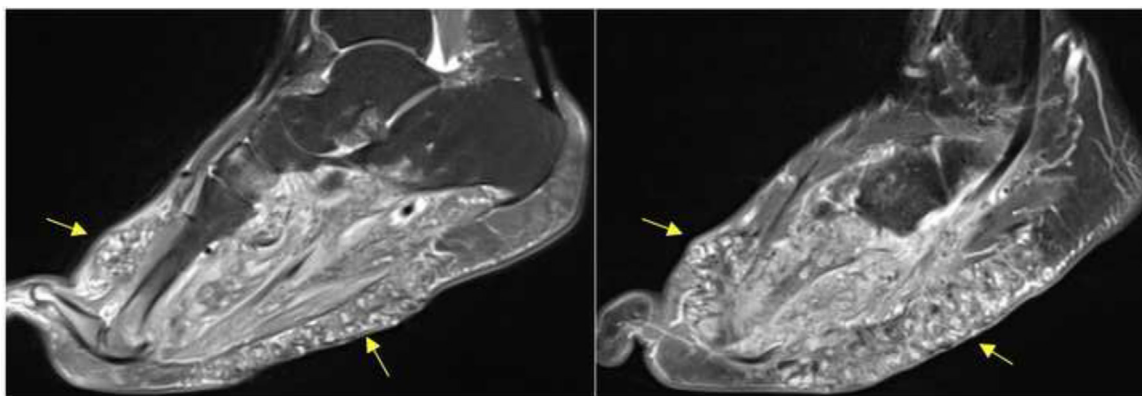


Fig. 6 – Case 2. Sagittal MRI sections in data proton weighting (A) and fat-suppressed T1 weighting after gadolinium injection (B), showing the previously described mycetoma grains, with infiltration of the adjacent muscles, and intermuscular fascial planes. Some of them have the "dot in a circle".

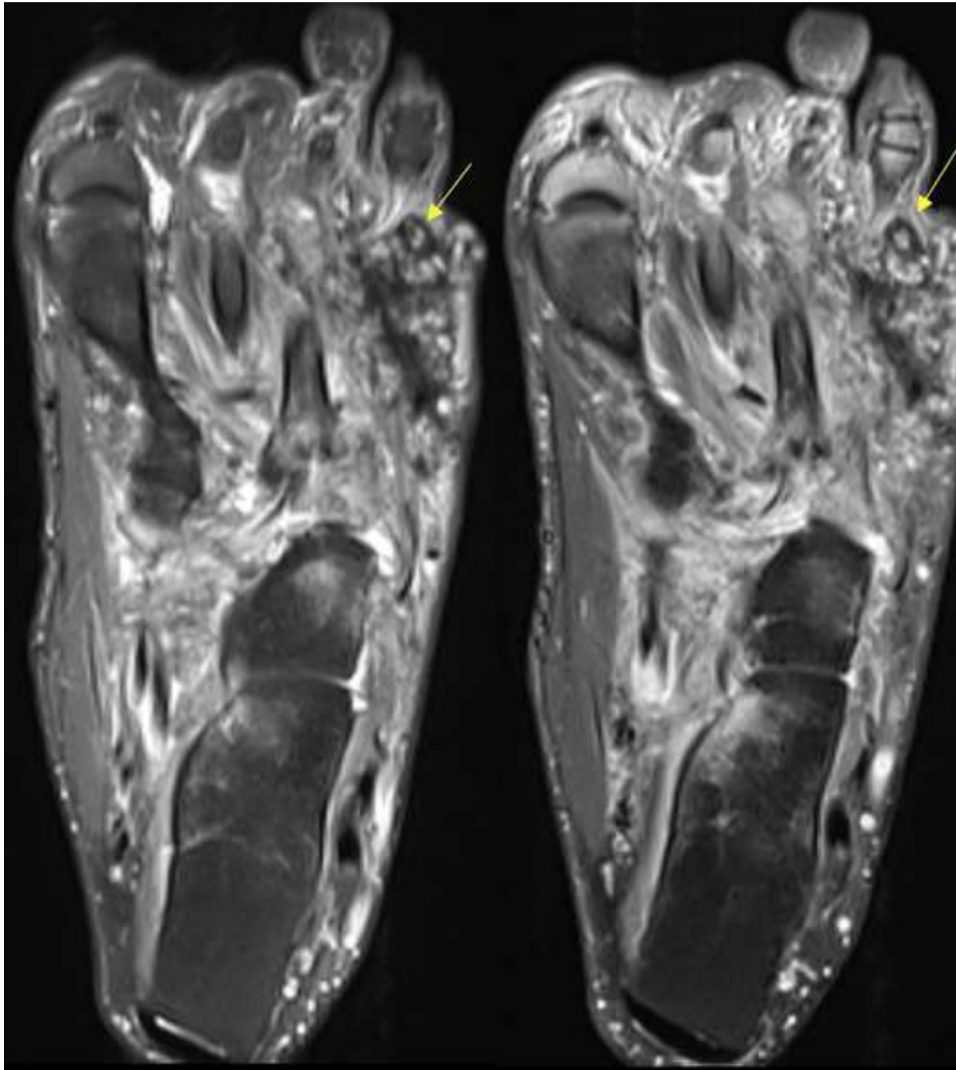


Fig. 7 – Case 2. Coronal MRI sections in proton data weighting (A) and fat-suppressed T1 weighting after intravenous gadolinium injection (B), showing the previously described mycetoma grains with the “dot in a circle sign” and effusion of the 4 last metatarsophalangeal joints as well as synovial thickening. Note also the bone-marrow edema in the cuboid as well as the 4th and 5th metatarsal bones, possibly consistent with osteomyelitis.

this complication may lead to permanent functional impairment and even amputation. The first radiological examination usually realized is standard radiography. In some cases, it can show signs like cortical thinning or hypertrophy as well as the presence of bone cavities or osteoporosis. Ultrasonography, on the other hand, is more interesting for assessment of soft tissue extension. CT scanning is important in indicating the bone involvement as it can detect: bone destruction, erosions, periosteal reaction and soft tissue involvement [2].

Nonetheless, MRI is the gold standard to evaluate both the soft tissues and early bone involvements. It can show the “the dot-in-circle” sign, which was first described by Sarris et al, corresponding to a central spherical hypointense signal (grains), surrounded by a hyperintense signal (the granuloma), with a peripheral low-signal matrix representing fibrous tissue [3,4]. Likewise, we found this sign in both our patients. The recurrence rate can vary between 20% and 90%. MRI can be helpful in early diagnosis and to monitor recurrence [1].

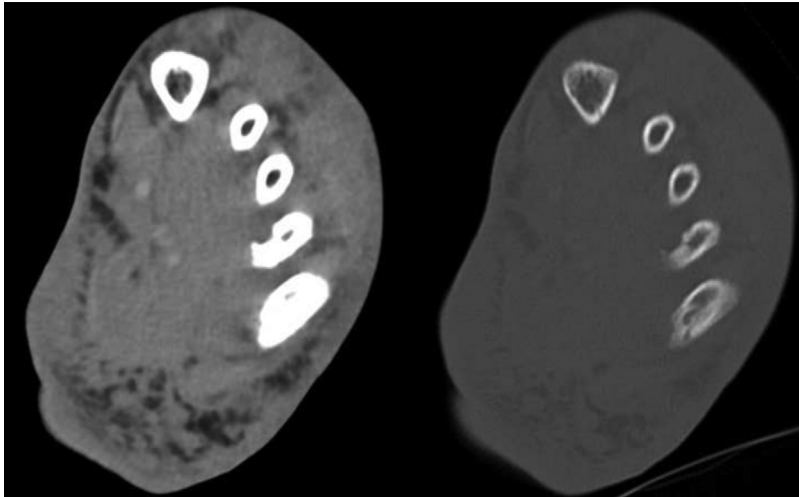


Fig. 8 – Case 2. CT scan confirmed osteomyelitis, that we can see here on the 4th and 5th metatarsal bones.

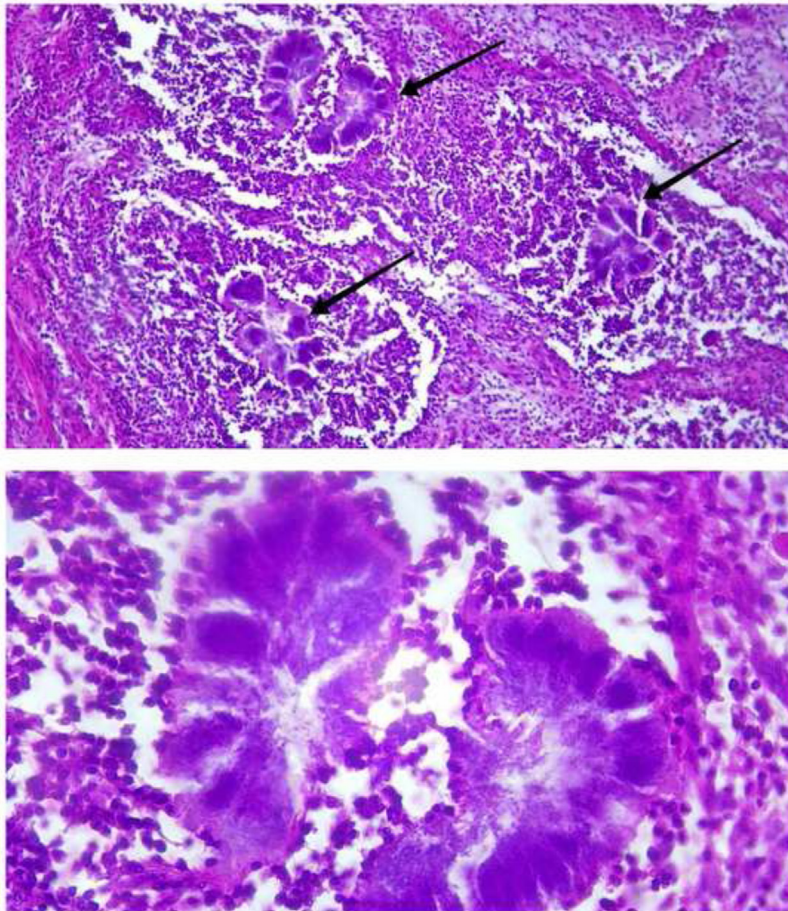


Fig. 9 – Low-power (upper) and higher-power (lower) magnification of histological images with Hematoxylin and eosin stain (HE), showing large necrotic and suppurative areas with numerous filamentous tufts with a basophilic center (black arrows). Lower image shows a filamentous tuft seen at high magnification [x40 HE].

Conclusion

The present report presents the MRI aspects of this sporadic disease, which is essential to know since early assessment of the extension can improve the prognosis. The involvement of dermatologists, radiologists and biologists is required. The initial treatment is medicinal and surgery takes place in late stages.

Patient consent

Written and informed consent for publication of the case was obtained from the patient.

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