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Fungal cerebritis and hemispheric infarction following scalp contamination

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Abstract

This is the first reported case of the relatively recently described Apophysomyces variabilis causing cerebritis and death following contamination of a degloving injury to the scalp. It highlights the need for clinical suspicion and early diagnosis so that aggressive surgical debridement can be performed.

Keywords: Mucormycosis, brain infarction, head injury, apophysomyces variabilis

Introduction

Apophysomyces is a filamentous fungus that is widely distributed in soil and decaying vegetation [1]. It is found most commonly in tropical to subtropical regions and it belongs to the phylum Zygomycota that are characterized by nonseptate, broad branching hyphae [2]. The class of Zygomycota contains three orders namely; Mucorales, Mortierellales, and Entomophthorales. Apophysomyces is a species in the Mucorales order and the diseases produced by these fungi are referred to by the label Mucormycosis [3]. This was previously known as zygomycosis and phycomycosis and was first described by Paultauf in 1885 [4].

Whilst Mucormycosis is a relatively rare form of fungal infection it can be rapidly progressive and is the most acutely fatal fungal infection in humans. Mortality rates range from 15 to 34% [3,5,6]. Most cases represent opportunistic infections in immunocompromised patients, the most common being those with; poorly controlled diabetes [3,6], solid or haematological malignancies [7,8], iron overload [9], extensive burns or long term corticosteroid usage [2,5].

This report details a particularly unusual case of mucormycosis leading to hemispheric infarction and death that occurred with the recently discovered strain of Apophysomyces variabilis, in a young immunocompetent individual who had suffered a traumatic craniofacial injury.

Case report

A seventeen year old female patient was involved in high speed motor vehicle accident. She sustained a left sided degloving injury to the scalp and multiple facial fractures. She was initially taken to a local district hospital where the wound was dressed and broad spectrum antibiotics administered. She was then transferred to the tertiary trauma centre where she had an open reduction and fixation of facial fractures and debridement of the wound. Given the large distances involved (approximately 200 km from initial scene to the provincial hospital and then 1,500 km to the tertiary hospital in Perth, Western Austarlia) there was a delay of approximately thirty six hours from time of the accident to definitive surgical intervention. Due to soiled wound and delayed closure patient was started on intervenous Tazocin. Throughout this time she had been alert and orientated. At day 10 the wound dehisced and discharged frank pus wound swabs grew Enterobacter Cloacae and Streptococcus Maltophilia. She had two further wound washouts and swabs were taken on each occasion in order to guide intravenous antibiotic therapy and was started on Meropenem. On day 26 she complained of increasingly severe headache, became drowsy with GCS of E1V2M5 and developed septic shock which required her to be admitted to the intensive care for respiratory and cardiovascular support. A CT brain revealed erosion of the cortical bone with evidence of underlying cerebritis (**Figure 1**). She was taken to theatre where the bone was found to be blacked, avascular and necrotic. This was debrided and subsequent microscopy revealed fungal spores. She was commenced on intravenous liposomal amphotericin (AmBisone) at a dose of 10mg/kg and subsequent microscopy confirmed growth of Apophysomyces variabilis. On day thirty she developed a right sided weakness and fixed dilated left pupil. CT scan revealed extensive cerebral swelling with midline shift (**Figure 2**). She died soon thereafter.

Discussion

Over recent years the fungus Apophysomyces has been emerging as an increasing source of severe infections among humans [11]. The fungus Apophysomyces elegens was discovered in 1979 [1] and until recently was considered the only species in the genus. However a recent polyphasic study showed that the genus contains 4 well-characterized species [3] one of which was Apophysomyces variabilis [12]. These fungi are a slightly unusual member of the Mucorales genus because they have been shown to cause both superficial and angio invasive mucormycosis infection in immunocompetent

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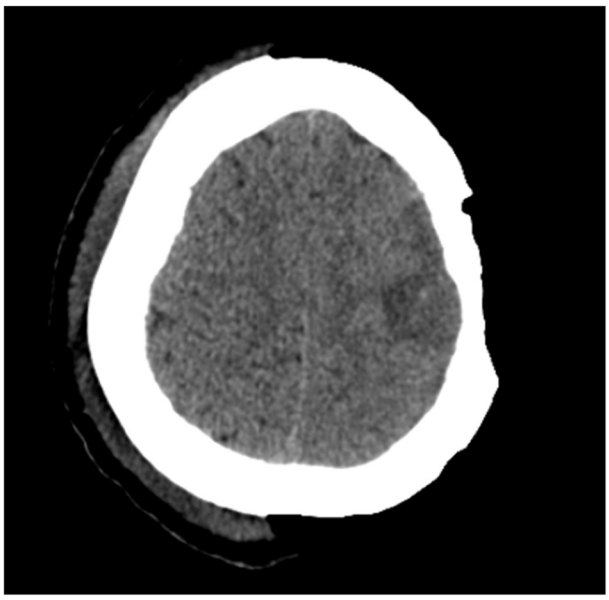

Figure 1. Contrast axial CT brain scan showing on the left erosion of the outer cortex of the parietal convexity and subcortical low density in the region of the left lateral precentral gyrus. These appearances are in keeping with osteomyelitis with an underlying focal encephalitis.

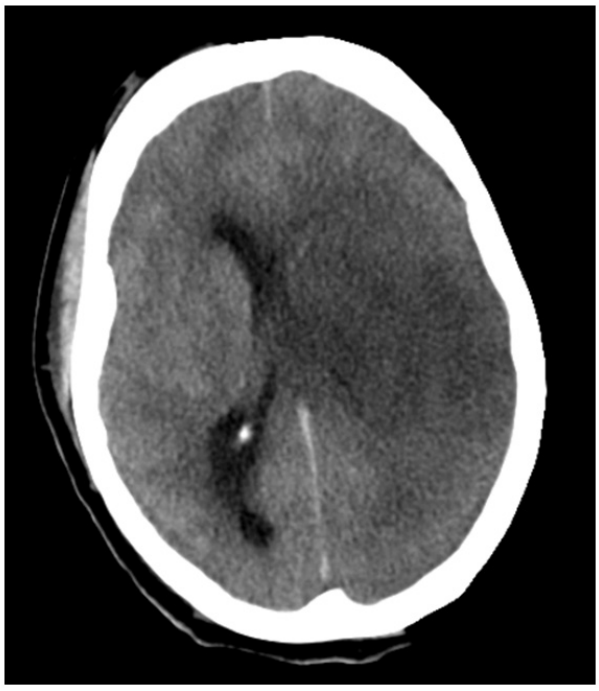

Figure 2. Contrast axial CT brain scan showing progression of the features in **Figure 1**, with extensive left sided cytotoxic oedema, effacement of the cortical sulci and midline shift.

patients [11]. The microscopic morphology seen in tissues infected with Apophysomyces is similar to that seen with other mucorales in which pleomorphic, thin walled, aseptate hypal elements invade tissues and blood vessels causing an acute inflammatory response with necrosis and abscess formation [11].

Patient was young and immunocompetent, was started on Tazocin, which was later changed to Meropenem as per results of the wound swabs under guidance of infectious diseases team. During initial washout no aggressive debridement was undertaken, no tissue sample was sent for histopathalogical diagnosis or investigations specifically looking for fungal infection were not requested. In retrospective we think Enterobacter Cloacae and Streptococcus Maltophilia positive swab cultures represented concomitant infection along with fungus infestation. Apophysomyces identification requires sporulation which happens only in nutrient deficient culture medium and definitive diagnosis also requires histopathalogical demonstration of tissue invasion.

Conclusion

This case serves to highlight that a high index of suspicion is required in contaminated wounds that fail to heal with standard surgical lavage and antibiotic therapy. It also emphasises the importance of obtaining tissue samples for histopathalogical diagnosis and specifically requesting fungal cultures. We advise early aggressive surgical debridement best before involvement of brain parenchyma and appropriate antifungal therapy as per specialist microbiologist to be instigated.

Previous cases have demonstrated that extensive calvarial infection can be satisfactorily managed with extensive surgical debridement and this case illustrates the aggressive nature of mucormycosis infection [13,14]. It is the first reported case of the relatively recently described Apophysomyces variabilis causing intracranial infection and hemispheric infarction.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	GC	SH
Research concept and design	√	--
Collection and/or assembly of data	√	--
Data analysis and interpretation	√	--
Writing the article	√	--
Critical revision of the article	--	√
Final approval of article	√	--
Statistical analysis	√	--

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