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Neurosurgical Biopsy and Resection for Diagnosis and Treatment of *Balamuthia mandrillaris* Amebic Encephalitis, United States

Appendix 2

Appendix 2 Table 1. A literature review of cases of *Balamuthia mandrillaris* granulomatous amebic encephalitis treated with surgical resection

Citation	Country	Age, Sex	Symptoms	Location of brain lesions (#)	Reported Vasculitis	Antiamoebic medications (with dose and route if reported in publication)	Reported steroid use prior to <i>Balamuthia</i> diagnosis	Resected lesion	Additional lesions after procedure	Outcome (survival follow up months)
This case	USA	5 yo F	4 months of headache, seizures	Left occipital (1), left frontal (1)	Yes	See case report section	Yes	Left occipital (1), left frontal (1)	Yes, after first resection; no after second	Survived (4.5 years since diagnosis)
Mei et al. Clin Neurol Neurosurg. 2025 (1,2)	China	3 yo M	Slurred speech, seizures, fever	Left frontal	No	Miltefosine, fluconazole, rifampicin, albendazole, amphotericin B	Yes	Left frontal	No	Survived (1 mo)
Chen et al. BMC Neurol. 2025 (3)	China	9 yo M	Two days of dizziness treated initially as CNS tuberculosis	Right occipital lobe	No	Lincomycin, rifampicin, sulfamethoxazole, fluconazole, albendazole and gamma IFN	No	Right occipital lobe	Yes	Survived (24 months)
Zhang et al. Front Immunol. 2025 (4)	China	37 yo M	Right lower extremity lesion x6 mo, p/w dizziness, headache and AMS, treated initially as CNS tuberculosis x2 months	Left frontal lobe	No	Fluconazole 400 mg q day Flucytosine 1.5 g QID Clarithromycin 500 mg BID Miltefosine 50 mg PO q8h Albendazole (dose unclear) PO q12h Pentamidine 300 mg IV q day	No	Left frontal	Yes	Death
Teng et al. Int J Infect Dis. 2025 (5)	China	10 mo old M	Fever, seizures, AMS	Frontal, temporal, parietal, occipital	Yes	Azithromycin, albendazole, TMP/SMX, fluconazole and flucytosine	Yes	Right parietal	Not clear	Death

Citation	Country	Age, Sex	Symptoms	Location of brain lesions (#) lobes, basal ganglia, thalamus	Reported Vasculitis	Antiamoebic medications (with dose and route if reported in publication)	Reported steroid use prior to Balamuthia diagnosis	Resected lesion	Additional lesions after procedure	Outcome (survival follow up months)
Javed et al. Surg Neurol Int. 2024 (6)	Pakistan	33 yo F	Back pain, headache, vomiting	Right frontotemporal	Yes	Azithromycin, meropenem, metronidazole, fluconazole, co-trimoxazole, rifampicin (all IV), miltefosine, amphotericin B (IT)	No	Right frontotemporal	Yes	Death
Liu et al. BMC Infect Dis. 2023 (7)	China	61 yo M	Headache	Right frontal	Yes	Azithromycin, fluconazole, flucytosine, TMP-SMX	No	Frontal	Not clear	Death
Peng et al. BMC Infect Dis. 2022 (8)	China	54 yo M	Numbness, weakness, headache, diplopia, ataxia	Right parietal (1), left occipitoparietal (1)	No	TMP-SMX 960 mg (160 mg TMP) PO BID Azithromycin 500 mg PO daily Flucytosine 2500 mg IV q12h Amphotericin B IV titrated to 30 mg daily Fluconazole 600 mg IV daily (replaced amphotericin B after 1mo) Final regimen: TMP-SMX PO, azithromycin PO	No	Right Parietal; Left occipitoparietal	Yes	Survived (7 mo)
Cuoco et al. Pediatr Infect Dis J. 2022 (9)	U.S.A.	4 yo M	Agitation, irritability, GTC seizure	Right posterolateral parietal	No	Flucytosine 750 mg PO QID* Miltefosine 50 mg PO BID* TMP-SMX 100 mg PO TID* Azithromycin 200 mg PO daily* Fluconazole 200 mg PO daily*	No	Parietal	No	Survived (12 mo)
Shehab et al. J Pediatric Infect Dis Soc. 2018 (10)	U.S.A.	13 yo F	Abdominal pain and headaches progressing to left-sided weakness, slurred speech and vomiting	Right parietal	Yes	Miltefosine, fluconazole, flucytosine, azithromycin, and sulfadiazine	Yes	Parietal	Yes	Death
Lehmer LM et al. Dermatol Online J. 2017 (11)	U.S.A.	84 yo M	Nodular ulcerative skin lesion; followed by headache, confusion, aphasia, apraxia	Bilateral occipital	Skin - yes, brain - no	Azithromycin, flucytosine, sulfadiazine	No	One of two occipital masses	No	Survived (12 mo)

Citation	Country	Age, Sex	Symptoms	Location of brain lesions (#)	Reported Vasculitis	Antiamoebic medications (with dose and route if reported in publication)	Reported steroid use prior to Balamuthia diagnosis	Resected lesion	Additional lesions after procedure	Outcome (survival follow up months)
Kobayashi et al. Pathology. 2015 (12)	Japan	57 yo F	Headache, dysarthria	Right frontal lobe	No	None	Yes	Frontal lobe	Yes	Death
Krasaelap et al. Korean J Parasitol. 2013 (13)	Thailand	4 yo F	Headache, vomiting, ataxia; presented with obstructive hydrocephalus, tonsillar herniation	Right cerebellar hemisphere	No	Pentamidine 4 mg/kg/day Sulfasalazine 200 mg/kg/day Fluconazole 12 mg/kg/day Clarithromycin 14 mg/kg/day Amphotericin B 1 mg/kg/day	No	Cerebellar	No	Death
Doyle et al. J Neurosurg. 2011 (14)	Australia	80 yo F	Skin plaques and nodules on the hand, followed by GTC seizures, disorientation, and seizure 1 mo later	Right medial frontal	No	Pentamidine 300 mg IV daily Azithromycin 600 mg PO daily Itraconazole 200 mg PO BID Sulfadiazine 1500 mg PO QID Flucytosine 1000 mg PO TID Amphotericin B liposomal 3 mg/kg IV daily replaced pentamidine for 4 weeks Final regimen: Azithromycin, itraconazole, sulfadiazine, flucytosine (7 mo total)	Yes	Right medial frontal	No	Survived (18 mo)
Botterill et al. Clin Neurol and Neurosurg. 2011 (15)										
Sarica et al. Turkish Neurosurg. 2009 (16)	Turkey	75 yo M	Headaches, speech problems and nervousness	Left temporal	No	Amphotericin B IV 1.5 mg/kg/day divided BID, followed by Amphotericin B liposomal 200 mg IV daily Miconazole 350 mg/m ² /day IV divided TID	No	Left temporal abscess drainage with capsule resection	No	Death
Tavares et al. J Clin Microbiol. 2006 (17)	Portugal	8 yo M	Progressive headaches, diplopia, vomiting, lethargy, papilledema	Right frontal and right temporal	Yes	Fluconazole (10 mg/kg) Trimethoprim-sulfamethoxazole (15 mg/kg) Rifampin (10 mg/kg)	Yes	Right frontal	Yes	Death
Galarza et al. Pediatr Neurol. 2002 (18)	Argentina	12 yo M	Non-caseating skin lesions followed by fever, lethargy, hemiparesis	Cerebral, brainstem and cerebellum (many)	No	Pentamidine, flucytosine, and fluconazole ("usual doses")	Yes	Cortical mass	Not clear	Death
	Argentina	5 yo M	Chronic osteomyelitis and granulomatous skin lesion x1y, seizure, LOC	Cerebral, mostly frontal (many)	No	Pentamidine, flucytosine, fluconazole, and clarithromycin ("usual doses")	No	One frontal lesion	Not clear	Death

Citation	Country	Age, Sex	Symptoms	Location of brain lesions (#)	Reported Vasculitis	Antiamoebic medications (with dose and route if reported in publication)	Reported steroid use prior to Balamuthia diagnosis	Resected lesion	Additional lesions after procedure	Outcome (survival follow up months)
	Argentina	3 yo F	Partial seizures, decreased LOC, left hemiparesis	Right frontal	No	Pentamidine, flucytosine, fluconazole, and clarithromycin ("high doses")	No	Frontal lesion	Not clear	Death
Deol et al. Surg Neurol. 2000 (19)	U.S.A.	38 yo M	Skin nodules, ulcers for 6 mo, then seizures	Temporal (1), occipital (1)	No	No	Yes	Occipital lesion	Yes	Death

Abbreviations used: yo – year(s) old; mo – month(s); M – male; F - female; GTC – generalized tonic-clonic; CNS – central nervous system; PO - per oral; IV – intravenous; IT - intrathecal; q – every, d - day, BID – twice a day; TID – three times a day; QID – four times a day; TMP-SMX – trimethoprim-sulfamethoxazole; g – grams; mg – milligrams; kg – kilograms; mg/m² – milligrams per square meter. *Route of administration confirmed with corresponding author (J. Cuoco, pers. comm., email, 2026 Jan 8).

Appendix 2 Table 2. Brief summary of outcomes of *Balamuthia mandrillaris* granulomatous amoebic encephalitis cases with subtotal resection or biopsy

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamoebic treatment	Antiamoebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
1	Degese et al. Acta Parasitol. 2025 (20).	36 yo M with behavior changes, disorientation, seizures, headache	Not clear	Not described	Not described	Not clear	Death
2		7 yo F headache and increased intracranial pressure and 3 years ago plaques on right upper extremity	Not clear	Not described	Not described	Not clear	Death
3		2 yo M with generalized tonic-clonic seizures	Not clear	Not described	Flucytosine, fluconazole, albendazole, miltefosine and nitroline (sulfadiazine discontinued due to neutropenia)	Not clear	Survived
4	Khurana et al. Indian J Med Microbiol. 2015 (21).	18 yo M with 2 weeks of headache diplopia, fever and vomiting x1 week	Yes	Not described (but treated for CNS TB prior to biopsy)	Albendazole, amphotericin B, clarithromycin	Not clear	Death
5	Griesemer et al. Pediatr Neurol. 1994 (22).	13 yo F with headache and diplopia and vomiting	Yes	Yes	None	Not clear	Death
6	Edminster et al. Acta Neuropathol Commun. 2025 (23).	58 yo F with 10 days of progressive right facial numbness, left-sided hemiparesis, imbalance, and tinnitus	No	Yes and cyclophosphamide	None (broad-spectrum antimicrobials)	Yes	Death
7	Liang et al. Diagn Microbiol Infect Dis. 2025 (24).	49 yo F in China with right lower extremity cutaneous lesion 6 mo prior, followed by	Yes	Not described	Azithromycin (500mg, QD) Metronidazole (0.5g, Q8H) Flucytosine (1.5g, Q6H) Fluconazole (0.4g, QD)	Not clear	Survived (2 months)

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamebic treatment	Antiamebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
		headache, nausea and vomiting			compound Sulfamethoxazole tablets (1.6g, Q6H)		
8	Ono et al. <i>Neuropathology</i> . 2024 (25).	76 yo F in Japan with 3 weeks nausea and headache	Yes	Yes, treated as CNS TB initially	Azithromycin, flucytosine, rifampicin, fluconazole	Not clear	Death
9	Atay Ünal et al. <i>Pediatr Infect Dis J</i> . 2024 (26)	12 yo M with 1 week of fever, drowsiness, behavioral changes preceded by 1 month of headache, vomiting	No	Yes	Liposomal amphotericin B 5mg/kg Metronidazole 40 mg/kg/day Azithromycin 500 mg IV once daily TMP/SMX 12 mg TMP/kg/day	No	Death
10	Gramp et al. <i>Australas J Dermatol</i> . 2023 (27).	66 yo M in Australia with 2 mo of right upper extremity skin lesion followed by fall, seizures, clumsiness and left-sided parasthesia	No	Not described	Albendazole 400 mg BID Fluconazole 200 mg BID Miltefosine 50 mg TID	No	Death
11	Spottiswoode et al. <i>Emerg Infect Dis</i> . 2023 (28).	Male in his 50s, presenting with generalized seizure and AMS	No	Yes	Sulfadiazine (1,500 mg PO QID), Fluconazole (1,000 mg [12 mg/kg] PO daily), Flucytosine (3,000 mg [37.5 mg/kg] PO QID), Pentamidine (330 mg [4 mg/kg] IV daily). Azithromycin (500 mg PO daily), Miltefosine (50 mg PO TID), Albendazole (400 mg PO daily) Final regimen: Nitroxoline 250mg PO TID, miltefosine, azithromycin, albendazole, fluconazole, and dose-reduced flucytosine	Yes	Survived (15 months)
12	Kim et al. <i>Ann Lab Med</i> . 2022 (29).	50 yo M with mild speech disturbance and hemiparesis after focal seizure x3 days	No	Not described	Metronidazole, amphotericin B, sulfadiazine / pyrimethamine	Yes	Death

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamebic treatment	Antiamebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
13	Hirakata et al. BMC Neurol. 2021 (30).	60 yo Japanese F with left homonymous hemianopsia	Yes	Yes	Azithromycin (0.5 g/day), Sulfamethoxazole (1.2 g/day) Trimethoprim (0.24 g/day) Fosfluconazole (0.2 g/day)	Yes	Death
14	Lee et al. Yonsei Med J. 2021 (31).	50 yo M with mild speech disturbance and hemiparesis after focal seizure x3 days	No	Yes	"Antiamebiasis medications"	Yes	Death
15	Safavi et al. Am J Trop Med Hyg. 2021 (32).	3 yo F from Iran with ataxia, AMS, seizure, left hemiparesis	Yes	Not described	Rifampin, metronidazole, miltefosine	Not clear	Death
16	Suzuki et al. Clin Imaging. 2020 (33).	68 yo M with right hemiparesis and seizure	No	Yes	Not described	Yes	Death
17	Piper et al. Int J Infect Dis. 2018 (34).	69 yo F with remote breast cancer history with one year of chronic sinus infection leading to saline irrigation with filtered tap water leading to nasal lesions followed by 1 year later left upper extremity focal seizure → generalized tonic clonic seizure	No	Yes	Miltefosine (50 mg three times daily) Pentamidine (4 mg/kg/day) Sulfadiazine (1.5 g every 6 hours) Flucytosine (37.5 mg/kg every 6 hours) Fluconazole (12 mg/kg/day administered in one dose) Azithromycin (20 mg/kg/day administered in one dose)	Yes	Death
18	Tarai et al. Jpn J Infect Dis. 2018 (35).	57 yo M with history of sarcoidosis treated with steroids presented with seizures, AMS	Yes	Yes	Fluconazole 400mg IV daily TMP/SMX 160/800mg BID route not specified Voriconazole 200mg IV BID	Not clear	Death
19	Farnon et al. Clin Infect Dis. 2016 (36). CDC. MMWR Morb Mortal Wkly Rep. 2010 (37). LaFleur et al. J Radiol Case Rep. 2013 (38).	31 yo F with headache, nausea, AMS, seizure with innumerable brain lesions on presentation at post-transplant (renal) day 20.	bilateral cerebral hemispheres, brainstem, cerebellum and right thalamus	Not described	Pentamidine, sulfadiazine, flucytosine, fluconazole, azithromycin, amphotericin, miltefosine	Not clear	Death
20	CDC. MMWR Morb Mortal Wkly Rep. 2010 (39).	56 yo M with diabetes, hypertension, liver disease due to hepatocellular carcinoma and fatty liver who presented on PTD (liver) 17 with blurry vision,	Yes	Not described	Sulfadiazine, pyrimethamine, amphotericin	Not clear	Death

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamebic treatment	Antiamebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
21		fatigue and ataxia, followed by fever, AMS, fecal incontinence 24 yo M with ESRD due to T1DM and hypertension, kidney pancreas transplant with anti-thymoglobulin treatment who presented on PTD 24 with 5 days of headache, nausea, vomiting, fever	Yes	Not described	Amphotericin, albendazole, fluconazole, azithromycin, and miltefosine	No	Death
22	Greninger et al. <i>Genome Med.</i> 2015 (40,41).	15 yo F with insulin dependent diabetes mellitus, celiac disease p/w 7 days right upper extremity weakness, headache, vomiting, ataxia and confusion	Yes	Yes	Azithromycin, sulfadiazine, pentamidine, and flucytosine	Yes	Death
23	Roy et al. <i>Parasitol Res.</i> 2015 (42).	11 yo M with 3 weeks of nausea, vomiting, lethargy, clumsiness and right-sided weakness leading to fall; and 4 months of changed handwriting and reading / talking changes and poor performance at school	Yes	Yes	Azithromycin Day(D) 3+58 days 750mg IV daily Fluconazole D3+58 days 400mg IV daily Flucytosine D3+58 days 1000mg to 1425mg pNG q6 hours Pentamidine D3+23 days 160mg IV daily Sulfadiazine 500mg PO / pNG q6 hours D3+58 days Miltefosine 50mg pNG BID D7+26.5 days Amphotericin B10mg/kg/day IV daily D2+3 days Metronidazole D22+39 days 370mg IV q6 hours	Yes	Death
24	Wilson et al. <i>Ann Neurol.</i> 2015 (43).	74 yo Chinese F immigrated to US 8 years prior with history of rheumatoid arthritis on hydroxychloroquine who presents with AMS	Yes	Not described	None, broad-spectrum antimicrobial and anti-toxoplasmosis coverage	Yes	Death
25	Tello-Zavala et al. <i>Pediatr Infect Dis J.</i> 2014 (44).	4yo M with nausea, vomiting and headache progressing to 2.5 weeks leading to ataxia,	No	Yes	Amphotericin B, dexamethasone	Yes	Death

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamebic treatment	Antiamebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
		abnormal eye movements, dysarthria, with CN palsies, dysmetria and dysdiadochokinesia					
26	Lobo et al. Parasitol Res. 2013 (45).	48 yo F from New York with diplopia, slurred speech, headache, cranial nerve palsies	Yes	Yes	No antiamebic therapy; broad-spectrum antimicrobials	Not clear	Death
27	Phillips et al. Clin Neurol Neurosurg. 2013 (46).	59yo M with headache, numbness, tingling, dysmetria and dysdiadochokinesia	Yes	Yes	Azithromycin, pentamidine, rifampin, fluconazole and TMP/SMX	No	Death
28	Bando et al. Pathol Int. 2012 (47).	68 yo M with progressive right lower extremity hemiparesis x3 months	Yes	Yes	None	Yes	Death
29	Stidd et al. World Neurosurg. 2012 (48).	2 yo F with falls for 1.5 weeks, ataxia, irritability and lethargy	Yes	Yes	None	Not clear	Death
30	Yamasaki et al. Neurol Med Chir (Tokyo). 2011 (49).	51 yo F with partial seizure progressing to right hemiparesis	No	Yes	No	Yes	Death
31	Ghosh et al. Neurology. 2011 (50).	4 yo M with 2 months of headache	No	Not described	Broad-spectrum antimicrobials including amphotericin and fluconazole	Yes	Death
32	Hill et al. Pediatr Neurol. 2011 (51).	8 mo old F with lethargy and irritability x4 weeks and then left-sided weakness and left facial palsy	Yes, but atypical infarction lesions	Yes	Anti-TB therapy and anti-fungal therapy including amphotericin B, rifampicin, INH, amikacin and moxifloxacin and IVIG	Not clear	Death
33	Cary et al. Pediatrics. 2010 (52).	2 yo M from Kentucky with drowsiness, falls, abnormal eye movements and hyponatremia	Yes	Not described (but treated as CNS TB initially)	Anti-TB therapy prior to <i>Balamuthia</i> diagnosis then Pentamidine (4 mg/kg per day) Fluconazole (12 mg/kg per day) Flucytosine (150 mg/kg per day) Sulfadiazine (200 mg/kg per day) Clarithromycin (14 mg/kg per day)	No	Survived (22 months into therapy)
34	Silva et al. Arch Neurol. 2010 (53).	47 yo F p/w frontal headache x8d, vomiting x2d followed by	Not clear	Yes	Anti-TB and toxoplasmosis therapy including sulfadiazine and broad-spectrum antimicrobials	Not clear	Death

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamebic treatment	Antiamebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
35	Kansagra et al. J Neurosurg. 2009 (54).	43 yo M with common nystagmus, ataxia and dysmetria 43 yo M with common variable immune deficiency, asplenia with fevers, headache and nausea progressing to vomiting, diplopia, ataxia while on treatment for presumptive fungal meningitis; two months in symptoms progressed to AMS, CNVI palsy, staring spells	Not clear	Not described	Pentamidine, flucytosine, sulfadiazine, nystatin and meropenem	No	Death
36	Perez et al. Ann Diagn Pathol. 2007 (55).	40 yo M with alcoholism, hepatitis C, presenting with seizures, headache and myalgias and expressive and receptive aphasia	Yes	Yes	None	Not clear	Death
37	Li et al. Brain Pathol. 2005 (56).	6 yo F with gradually worsening headache, stiff neck, nausea and vomiting, and fever x several days	No	Not described	Pentamidine, sulfadiazine, itraconazole and azithromycin	Yes	Death
38	Jung et al. Arch Pathol Lab Med. 2004 (57).	72 yo F with focal motor seizure of left face and left hand, transient visual loss and aphasia	Yes	Not described	Pentamidine 300 mg IV daily Sulfadiazine 1500 mg BID Fluconazole 400 mg daily Clarithromycin 500 mg TID	No	Survived (6 mo)
39	Bakardjiev et al. Pediatr Infect Dis J. 2003 (58).	2 yo F in California, USA with headache, left abnormal eye movement, papilledema, right hemiparesis	Yes	Yes	TB therapy and broad-spectrum antimicrobials	Not clear	Death
40		7 yo M in California, USA with seizures, ataxia, CNVI palsy	Yes	Yes	Broad-spectrum antimicrobials and antifungals and flucytosine was added with <i>Balamuthia</i> diagnosis	Not clear	Death
41		30 mo M in Texas, USA with fever, emesis and ataxia	Yes	Not described	IV pentamidine, metronidazole, fluconazole, amphotericin B and PO itraconazole, flucytosine, azithromycin and sulfadiazine	Not clear	Death

Case No.	Citation	Clinical presentation	More than one lesion prior to biopsy	Steroids prior to antiamebic treatment	Antiamebic Treatment (with doses if described)	Increased # lesions after biopsy	Outcome (duration at follow up if given)
42	Deetz et al. Clin Infect Dis. 2003 (59).	64 yo M in California with right hemiparesis and dysarthria	Yes	Yes	TB treatment until biopsy showed ameba then Flucytosine 2g po q6 hours Fluconazole 400mg daily Pentamidine 4 mg/kg/IV q day IV Sulfadiazine 1.5g PO q6 hours Clarithromycin 500mg daily Remained over next 5 years on fluconazole and sulfadiazine	Yes	Survived
43		5 yo F in California with seizures	Yes	Not described	Initially ketoconazole and metronidazole; then Clarithromycin 14 mg/kg/day Flucytosine 110 mg/kg/day Fluconazole 14 mg/kg/day Pentamidine 1mg/kg/day	Not clear	Survived (after 520 days of treatment)
44	Healy JF. AJNR Am J Neuroradiol. 2002 (60).	5 yo F presents with GTC seizure	Yes	Not described	"Antiamebic drugs" x16 months	No	Survived as of time of publication
45	Katz et al. Arch Neurol. 2000 (61).	52 yo F with idiopathic seizures, chronic neutropenia of unknown cause with progressive lethargy, headaches, and coma	Yes	Yes	Broad-spectrum coverage including amphotericin, fluconazole, TMP/SMX, meropenem, isoniazid, rifampin, ethambutol, pyrazinamide, and metronidazole	No	Death
46	Kodet et al. Pathol Res Pract. 1998 (62).	3 yo M with progressive fatigue, seizures and LOC	No	Not described (other than "treated for cerebral edema")	TMP/SMX, amphotericin B, azithromycin, pentamidine	Yes	Death
47	Denney et al. Clin Infect Dis. 1997 (63).	32 yo M with nausea, vomiting and lethargy	Yes	Yes	Anti-TB, antistaphylococcal and anti-anaerobic therapy	Not clear	Death
48	Reed et al. Med J Aust. 1997 (64).	5 yo M with 18 months of facial skin lesion presented with fever, ataxia and diplopia	Yes	Yes	None	Not clear	Death

Abbreviations used: yo - years old; mo - month; GTC - generalized tonic-clonic; LOC - loss of consciousness; PTD - post transplant day; CN - cranial nerve; TB - tuberculosis; AMS - altered mental status; ESRD - end stage renal disease; T1DM - type 1 diabetes mellitus
 TMP-SMX - trimethoprim-sulfamethoxazole; INH - isoniazid; IVIG - intravenous immunoglobulin
 PO - per oral; IV - intravenous; IT - intrathecal; pNG - per nasogastric; q - every; d/D - day(s); BID - twice a day; TID - three times a day; QID - four times a day; g - grams; mg - milligrams; kg - kilograms; mg/m² - milligrams per square meter

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