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Case Report

Streptobacillus moniliformis endocarditis: Case report and review of literature



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ABSTRACT

Rat bite fever is a rare infection and sometimes results in complications. This case report describes native mitral valve endocarditis in a 44-year-old male patient caused by *Streptobacillus moniliformis*. The diagnosis was confirmed by transesophageal echocardiography and blood cultures (BACTEC). The patient was treated with IV crystalline penicillin (6 weeks) and gentamicin (2 weeks). The fundamental importance of a high index of suspicion, interpreting investigations and appropriateness of therapy are highlighted.

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1. Introduction

Rat bite fever (RBF) is a little thought of entity when evaluating fevers. It is usually suspected when there is history of bite by a rodent and is confirmed by culture reports. We describe a case of relapsing fever complicated by native valve endocarditis caused by *Streptobacillus moniliformis*.

2. Case report

A 44-year-old gentleman was admitted with history of one week fever every 21 days. He had been treated with quinolones, cephalosporins and artemether for three individual episodes of fever, respectively.

Clinical examination was unremarkable. Basic laboratory investigations were non-contributory. An initial transthoracic echocardiogram revealed trivial mitral regurgitation and normal valves and biventricular systolic function. After 24 h, blood cultures (BACTEC) grew gram negative, pleomorphic, filamentous bacilli with side-swellings (Fig. 1). On subculture onto sheep blood agar non-hemolytic, gray, pinpoint colonies grew. The biochemical reactions were as follows: Oxidase, catalase, Indole nitrate reduction, glucose fermentation, citrate were negative and arginine was positive. Based on the morphology and biochemical reactions it was identified as *S. moniliformis*, sensitive to penicillin, erythromycin and ampicillin.

On specific questioning, the patient recalled being bitten on a finger 3 months ago, though he had not sighted the

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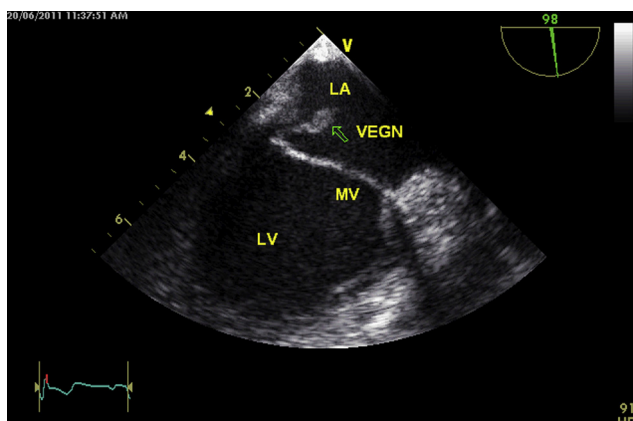


Fig. 1 – Transesophageal echocardiogram showing large vegetation on the mitral leaflet prolapsing into the left atrium.

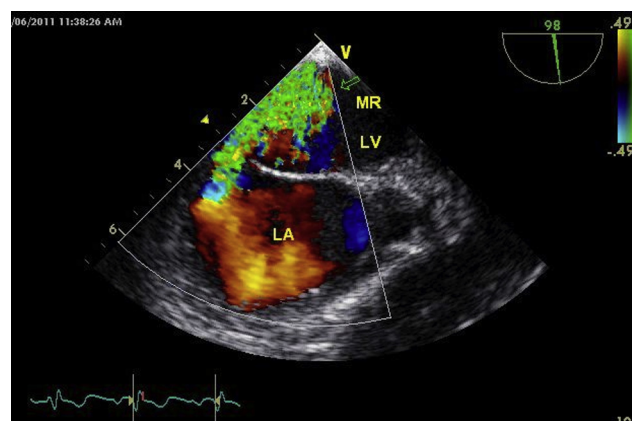


Fig. 2 – Transesophageal echocardiogram showing severe eccentric mitral regurgitation due to MV endocarditis with *Streptobacillus moniliformis*.

creature. Diagnosis of RBF was made and intravenous crystalline penicillin 200,000 units every 4 h was started, and was advised crystalline penicillin for a week followed by a week of oral amoxicillin 500 mg every 6 h. The patient was reviewed as an outpatient at the end of 2 weeks. Citing abdominal discomfort, patient had discontinued oral amoxicillin and later Doxycycline which was prescribed for a week.

A month later patient reported with history of 2 days fever. Suspecting a relapse, blood was drawn for culture, which again tested positive for *S. moniliformis*. A transesophageal echocardiogram (TEE) and bone scan were ordered. Patient was restarted on crystalline penicillin at the same dose. He became afebrile and repeat blood cultures were sterile. Bone scan was negative. A second transthoracic echocardiogram showed severe MR and a TEE done revealed a large vegetation on the mitral valve with perforation of the leaflet and severe mitral regurgitation (Figures 1 & 2). Though repeat cultures at end of the first week were negative, in view of the diagnosis of infective endocarditis, we increased the dose of crystalline penicillin to 20 lakh units every 4 h for 6 weeks and gentamicin was added for the first 2 weeks (Table 1). At 6 weeks, blood cultures were sterile and the patient was afebrile. Patient was started on a small dose of furosemide and ramipril and advised elective MVR. However, the patient was reluctant to undergo surgery and was doing well on medication one and a half years after the initial illness. He was on follow-up with a local physician.

3. Discussion

Rat bite fever is a systemic illness caused by infection with either *S. moniliformis* or *Spirillum minus*, both gram negative bacilli.¹ Case reports are almost exclusively secondary to *S. moniliformis*, probably because *S. moniliformis* is easier to isolate in the laboratory with current automated culture systems. Rats are colonized by *S. moniliformis* or *S. minus*. Human infection can result from a bite or scratch from an infected or colonized rat or consumption of contaminated food or water.¹ Children, pet owners, pet shop and animal research laboratory workers are more susceptible to infection.

The symptoms of RBF include fever, myalgias, arthralgias/arthritis, vomiting, headache and rash.^{1,2,4} Many serious complications reported include meningitis, pericardial effusion, endocarditis and multiple organ failure. The case-fatality rate is as high as 25% in untreated patients.¹ *S. minus* infection is differentiated from *S. moniliformis* infection by the following: a longer incubation period, intermittent/recurrent fever, large macular or papular rash, arthritis is rare, blood cultures are usually negative and the organism is seen on a dark field blood smear preparation. Broad-range PCR amplification of parts of the 16S rRNA genes followed by sequencing has also been demonstrated to identify this organism. Endocarditis is rare and usually the most lethal form.^{5–10} Majority of cases reported had underlying valvular abnormalities,⁷ prosthetic valve⁶ or rarely congenital heart disease.³ Native valve endocarditis is extremely unusual. For RBF intravenous penicillin

Table 1 – Course of treatment and antibiotic therapy.

Date	To	Drug	Dosage	Comments
5/5/2011	11/5/2011	Inj CP	2 lakh 4th hourly 1 week	Completed
12/5/2011	18/5/2011	Cap amoxicillin	500 mg 4 times a day 1 week	Took 2 days only
18/5/2011	24/5/2011	Cap doxycycline	100 mg twice daily 1 week	Took 2 days only
Patient was not on proper antibiotics from 12/5/2011 till 30/5/2011. However, he developed fever on 31/5/2011 only.				
31/5/2011	21/6/2011	Inj CP	2 lakh 4th hourly	Fever settled in 1 day
22/6/2011	21/7/2011	Inj CP + gentamicin	20 lakh 4th hourly (6 weeks) + 50 mg 8th hourly (2 weeks)	Completed

Table 2 – Review of cases of *Streptobacillus moniliformis* endocarditis.

Year/Ref	Age/sex	Underlying heart disease	Rat exposure	Clinical presentation	2DEcho/TEE	Blood C/S	Treatment	Outcome
1915 ^{a,7}	67/F	None	Rat bite	Fever, rash murmur			None	Died
1934	18/M	RHD	NS	Incomplete description			None	Died
1940 ^{a,7}	14/F	None	Rat bite	Fever anemia murmur,			None	Died
1944 ^{a,7}	43/M	RHD	Rat exposure	Fever, rash murmur			Penicillin 200,000U	Died
1945 ^{a,7}	22/M	RHD	NS	Murmur petechiae			Penicillin 300,000 U	Died
1947 ^{a,7}	17/F	NS	NS	Incomplete description			Penicillin 400,000 U	Died
1949 ^{a,7}	40/M	RHD	Rat exposure	Murmur/splenomegaly/ Osler's nodes/anemia			Penicillin 1 million U	Cured
1949 ^{a,7}	27/M	RHD	Handled dead rat	Fever, Murmur splenomegaly, Oslers nodes , anemia			Penicillin 1.2 million U Chloramphenicol	Cured
1952 ^{a,7}	54/M	None	Rat bite	Fever, rash, murmur			Penicillin 3 million U	Cured
1967 ^{a,7}	70/F	Calcific AS		Fever splenomegaly, murmur anemia			Penicillin 1.8 million units	Cured
1967 ^{a,7}	43/M	NS	Rat bite	Fever arthritis murmur per. effusion			Penicillin 10 million U	Died
1967 ^{a,7}	60/M	RHD	Rat exposure at workplace	Fever murmur			Penicillin 12 million U	Cured
1981 ^{a,7}	41/M	None	Rat bite	Fever murmur heart failure			Penicillin 40 million U + gentamicin	Sudden death 4 mths after treatment
1985 ^{a,7}	3 mo/M	None	Rat bite	Fever, lethargy			None	Died
1985 ^{a,7}	63/F	None	Rat bite	Fever, arthritis, murmur paresis			Penicillin 20 million U + Amikacin	Cured
1986 ^{a,7}	8/M	RHD	None	Fever, murmur hepatosplenomegaly 1deg avb			Penicillin 50,000 U/dy	Cured
1989 ¹¹	2 mth		Rat bite	Fever, pneumonia, hepatosplenomegaly meningitis	Autopsy: fibrinous endocarditis			Died
1992 ^{a,7}	46/M	None	Rat bite	Fever arthritis murmur hepatosplenomegaly ventr. bigeminy	Thickened AV. No vegn.	+ve	Penicillin 24 million + Tetracycline 500mgQ6H	Cured
2000 ⁸					Vegn + MR valve rupture	+ve	Ceftriaxone 2 g/dy 3 wks Genta 120 mg/d 2 wks Penicillin 24 million 1 wk	
2006 ³	18/M	Small VSD	Rat bite		TV vegn small VSD	+ve	Penicillin 12 million U + Genta 50 mg Q8H 4 wks	Cured
2007 ⁹	29/M		Rat bite	Fever, dizziness, lethargy	Large vegns/AR/Severe LV dysfunction (TEE)	Blood C/S –ve Explanted AV + ve culture	Ampicillin + ceftriaxone + gentamicin Early AVR CP/Fosfomycin/genta postop	Cured

2007 ⁶	60/F	S/P MVR	Rat bite	Fever intermittent Leg wound Weakness + wt loss	Prosthetic MV dehiscence + Sev MR + Vegns(TEE)	-ve PCR + ve	Redo MVR + Levoflox 500 mgOD Ceftriaxone 1 g Q 12 H IV Genta 1 mg/kg Q 8 H Oral doxycycline 100 mg Q12H Penicillin 12 million U + Genta	Cured
2013 (present)	44/M	None	Rat bite	Fever	MV vegn Sev. MR	BI C + ve		Cured

a Case no. 1–16: only 4 had echo and 2 had valvular vegetations.

followed by oral penicillin or ampicillin is usually recommended. In patients with penicillin allergy, alternatively tetracycline or doxycycline is used.^{1,4} In patients with infective endocarditis crystalline penicillin for 4 weeks plus gentamicin for 2 weeks have usually been used. In patients sensitive to penicillin, vancomycin with gentamicin can be used. Aminoglycosides enhance activity against the cell wall deficient L forms of *S. moniliformis*. There has been one previous case report of RBF with endocarditis from India.³ Poor culture techniques and empiric antibiotics may result in under-reporting of this condition. The cases previously reported in the literature have been summarized in Table 2. In the majority of cases reported, the clinical presentation may be nonspecific with fever, rashes, polyarthritides and murmur, which can mimic acute rheumatic carditis or culture negative endocarditis. However, a history of rat bite, positive echo/TEE for vegetations and positive blood culture for *S. moniliformis* or a positive PCR (16S rRNA gene) can confirm the diagnosis as in our case.

We present this case to draw attention to this little known infection caused by *S. moniliformis* with a rare complication of native valve endocarditis. This case report also highlights the importance of a good history, the utility of good culture techniques and TEE in diagnosis and ensuring the completion of the course of antibiotics.

4. Conclusion

Clinicians should consider RBF in the differential diagnosis of an unexplained febrile illness, especially in patients with relapsing or intermittent fever. Enquiring into history of bites is important when evaluating a PUO as patients may forget it or dismiss it as inconsequential. Native valve endocarditis on a structurally normal valve is extremely rare and requires blood culture or PCR and echo for diagnosis. TEE is preferred whenever there is a bacteremia, no obvious focus and sub-optimal transthoracic imaging. Adequate antibiotic therapy (dose and duration) is also important in preventing complications and completely eradicating the infection.

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Elliot SP. Rat bite fever and *Streptobacillus moniliformis*. *Clin Microbiol Rev.* 2007;20:13–22.
2. De AS, Baweja SM, Salunkhe PM, et al. Isolation of *Streptobacillus moniliformis* from the blood of a child with acute lymphoblastic leukemia. *Indian J Med Microbiol.* 2010;28:387–389.
3. Nandhakumar B, Thangam M, Shanmugasundaram S, et al. *Streptobacillus moniliformis* endocarditis. *Emerg Infect Dis.* 2006;12:1037–1038.
4. Gilroy SA, Khan MU. Rat bite fever: case report and review of literature. *Infect Dis Clin Pract.* 2002;11:403–405.

5. Shvarblat S, Kochie M, Hurber P, Howard J. Fatal rat bite fever in a pet shop employee. *Am J Ind Med.* 2004;45:357–360.
6. Chen PL, Lee NY, Yan JJ, et al. Prosthetic valve endocarditis caused by *Streptobacillus moniliformis*: a case of rat bite fever. *J Clin Microbiol.* 2007;45:3125–3126.
7. Rupp ME. *Streptobacillus moniliformis* endocarditis: case report and review. *Clin Infect Dis.* 1992;14:769–772.
8. Rordorf T, Zuger C, Zbinden R, et al. *Streptobacillus moniliformis* endocarditis in an HIV -positive patient. *Infection.* 2000;28:393–394.
9. Kondruweit M, Weyand M, Mahmoud FO, et al. Fulminant endocarditis caused by *Streptobacillus moniliformis* in a young man. *J Thor Cardiovasc Surg.* 2007;134:1579–1580.
10. Feigin RD, Cherry J, Demmler Harrison GJ, Kaplan SL. *Textbook of Paediatric Infectious Diseases.* In: *Bacterial Infections.* 5th ed. vol. 1. Saunders; 2009:1788–1791. Section XVI.
11. Sens MA, Brown EW, Wilson LR, et al. Fatal *Streptobacillus moniliformis* infection in a two-month-old infant. *Am J Clin Pathol.* 1989;91:612–616.