

Postoperative Mediastinitis Due to *Finegoldia magna* with Negative Blood Cultures[∇]

Solen Kernéis,^{1,2,3*} Matta Matta,^{1,2} Annie Buu Hoi,^{1,2} Isabelle Podglajen,^{1,2,4} Laurent Gutmann,^{1,2,4}
Ana Novara,⁵ Christian Latremouille,^{2,6} and Jean-Luc Mainardi^{1,2,4}

AP-HP, Hôpital Européen Georges Pompidou, Service de Microbiologie, Paris, France¹; Université Paris Descartes, Faculté de Médecine, Paris, France²; AP-HP, Hôpital Cochin Saint Vincent de Paul, CIC de Vaccinologie Cochin Pasteur, Paris, France³; UMR S 872, Equipe 12, Laboratoire de Recherche Moléculaire sur les Antibiotiques, Centre de Recherche Biomédical des Cordeliers, Université Paris Descartes et UPMC, Paris, France⁴; AP-HP, Hôpital Européen Georges Pompidou, Service de Réanimation Médicale, Paris, France⁵; and AP-HP, Hôpital Européen Georges Pompidou, Service de Chirurgie Cardiothoracique, Paris, France⁶

Received 17 June 2009/Returned for modification 1 September 2009/Accepted 1 October 2009

We report a case of *Finegoldia magna* (formerly known as *Peptostreptococcus magnus*) mediastinitis following coronary artery bypass in a 50-year-old patient. Even if staphylococci remain the main causative organism of postoperative mediastinitis, the responsibility of anaerobic bacteria must be considered in cases of fever and sternal drainage with negative blood cultures.

CASE REPORT

A 50-year-old man was admitted to the cardiothoracic surgery department to undergo coronary bypass surgery. His medical history was notable for high blood pressure, dyslipidemia, and myocardial infarction 2 years earlier, treated by percutaneous angioplasty of the right coronary artery. He also had undergone two surgical interventions on both maxillary sinuses in the past 20 years for recurrent sinusitis. Because of persisting chest pain episodes 1 year after the myocardial infarction, a cardiac catheterization was performed, which disclosed double-vessel coronary atherosclerosis. The patient underwent a double internal mammary-coronary artery bypass on 15 October 2008. The prophylactic antibiotherapy protocol included intranasal application of mupirocin before and 4 days after the intervention and intravenous cefamandole during surgery. Neither intraoperative nor immediate postoperative complications were noted. Three days after surgery, the patient was febrile at 38.9°C, in association with dehiscence and instability of the sternum, moderate pain, and local erythema. There was no sign of necrosis of the skin. His leukocyte count was 12,000/mm³. Three blood samples, respiratory, and urine samples were drawn, and all aerobic and anaerobic cultures were negative after 24 h (BacT/Alert with FAN medium containing charcoal; Biomérieux, Lyon, France). Purulent wound discharge appeared the day after, for which Gram stain and cultures were also negative after 24 h. Because of persistent fever and abundant exudates draining from the median sternotomy incision, a deep sternal puncture was performed. Cultures of the mediastinal fluid were all negative except for a single enriched liquid medium, which grew *Streptococcus oralis*. The patient was placed under intravenous antibiotherapy by amoxi-

cillin (amoxicilline), vancomycin, and gentamicin on 21 October and underwent extensive sternal and mediastinal debridement with placement of eight mediastinal drainage tubes on the same day. Blood cultures, all performed before administration of antibiotics, remained negative. However, all intraoperative cultures of mediastinal material grew within 48 h, and *Peptostreptococcus* sp. 16S RNA gene amplification and sequencing were carried out as described previously (11), leading to the identification of *Finegoldia magna* (formerly *Peptostreptococcus magnus*). The strain was susceptible to metronidazole and amoxicillin and resistant to clindamycin and erythromycin. Vancomycin and gentamicin were discontinued, and metronidazole was added to the amoxicillin. Apyrexia was obtained 2 days after surgery, and the patient completed a 6-week course of amoxicillin and metronidazole. On the last visit, 90 days after the first surgery, the patient was afebrile with satisfactory sternotomy closure.

Finegoldia magna is a gram-positive anaerobic coccus, part of the normal flora of the human mucocutaneous surfaces. It is frequently isolated in infections of soft tissues and the peritoneal cavity, and a few cases of endocarditis and pericarditis have also been reported (2, 9, 12, 17). Poststernotomy mediastinitis due to *F. magna* is far more uncommon. To our knowledge, only five cases formally due to *F. magna* have been reported to date (Table 1) (4–8, 15).

As shown in the table, anaerobic mediastinitis following cardiothoracic surgery is often polymicrobial (Table). However, in our case the association with *Streptococcus oralis* was not considered significant, since the *S. oralis* strain had been cultured in only one specimen in enriched medium and was not recovered in intraoperative cultures. Since anaerobes are often isolated in deep wound infections, it is surprising that anaerobic mediastinitis has been reported infrequently. Considering the increased isolation of anaerobic bacteria observed discussed elsewhere (10), one can hypothesize that this is due to

* Corresponding author. Mailing address: CIC de Vaccinologie Cochin Pasteur, Hôpital Cochin Saint Vincent de Paul, 27 rue du Fg St Jacques, 75679 Paris Cedex 14, France. Phone: 33 1 58 41 35 43. Fax: 33 1 58 41 29 10. E-mail: solen.kerneis@cch.aphp.fr.

[∇] Published ahead of print on 7 October 2009.

technical difficulties, highlighting the need for routine use of anaerobic blood culture bottles in cardiac surgery centers and enhancing the usefulness of mediastinal punctures.

The source of infection in our patient could not be established with certainty. A history of recurrent sinusitis was noted, but he had undergone two successful surgical procedures on the sinus several years before with no recent recurrence. He also had none of the particular conditions (i.e., malnutrition, immunosuppression or malignant or hematologic disease) which have been previously described as risk factors for anaerobic infection (10).

Since clinical examination and imaging techniques have shown low sensitivity and specificity in early diagnosis of post-surgical mediastinitis (1), blood cultures are frequently used as a diagnostic test. In the retrospective analysis of 266 patients displaying poststernotomy mediastinitis within the 60-day post-surgical period, blood culture seemed to be most accurate for patients with *Staphylococcus aureus* bacteremia (14). However, among patients with mediastinitis due to other infectious agents, 67% had negative blood cultures, like our patient. In general, reasons for negative blood cultures can be the following: (i) technical, (ii) linked to the type and/or site of infection, (iii) due to the nature of the microorganism, and/or (iv) caused by prior administration of antibiotics. In our case, all blood cultures had been drawn before administration of antibiotics. However, we cannot exclude that the blood culture system explains why blood cultures remained negative. Indeed, Bassetti et al. (2; these authors also cite reference 17) reported that a *Finegoldia magna* strain causing endocarditis did not grow in the BacT/AlertT and Bactec 9240 systems but grew in other systems, i.e., Septi-Chek BHI-S and the Isolator system. Complicated skin and skin structure infections with anaerobes are also classically not associated with positive blood cultures (13, 16), and gram-positive anaerobic cocci are difficult to grow.

As illustrated in our case, a diagnosis of bacterial mediastinitis is highly plausible for a patient with fever and sternal pain, drainage, or dehiscence following cardiothoracic surgery, even in the presence of negative repeated blood cultures. More-invasive procedures for confirmation of diagnosis (e.g., mediastinal puncture) are very helpful (3). In the review by Brook, the high rate of recovery of anaerobic bacteria (23%) in cases of postsurgical wound sternal infections was probably due to the systematic use of deep wound puncture (4). Mediastinal puncture contributes to earlier diagnosis and consequently reduces the length of mechanical ventilation and hospital stay, but its use is unfortunately not generalized (3).

In conclusion, anaerobic agents can be responsible for post-operative mediastinitis even if staphylococci remain the main causative organisms. This should particularly be kept in mind when facing a patient with fever and sternal drainage with negative blood cultures in the days following cardiothoracic surgery and should encourage the use of deep sternal puncture and anaerobic culture media for all microbiological samples. Appropriate sampling and culturing can probably lead to increased isolation of anaerobic pathogens in this postoperative complication.

No funding was obtained for this study.

TABLE 1. Reported cases of anaerobic poststernotomy wound infection

Yr (n ^a)	Age/gender	Type of surgery	Prophylaxis	Bacteriological findings		Antimicrobial therapy	Outcome	Reference
				Mediastinal fluid	Blood cultures			
1976 (1)	65/Male	Coronary bypass	Cephalotin	<i>Bacteroides fragilis</i>	<i>Bacteroides fragilis</i>	Clindamycin	Cured	7
1985 (2)	65/Male	Coronary bypass	Cephapirin	<i>Bacteroides brevis</i> , <i>Staphylococcus epidermidis</i>	<i>Bacteroides brevis</i>	Clindamycin, ticarcillin, gentamicin	Cured	15
1988 (1)	48/Male	Coronary bypass	Cephapirin	<i>Bacteroides fragilis</i> , <i>Staphylococcus epidermidis</i>	<i>Bacteroides fragilis</i>	Clindamycin, nafcillin, gentamicin	Cured	8
1989 (15 ^b)	Various	Various	Cefamandole	<i>Bacteroides oralis</i> , <i>Staphylococcus epidermidis</i> , α-hemolytic streptococci	<i>Bacteroides fragilis</i>	Clindamycin, vancomycin	Cured	8
1996 (2)	43/Female	Coronary bypass	Unknown	10 <i>Peptostreptococcus</i> isolates (including 4 <i>Finegoldia magna</i> ^c isolates ^d), and 4 <i>Bacteroides</i> , 2 <i>Propionibacterium</i> , and 2 <i>Clostridium</i> isolates	Not detailed	Various	Not detailed	4
2001 (4)	29/Male	Cardiac assist device	Unknown	<i>Staphylococcus aureus</i> , <i>Finegoldia magna</i> ^c	<i>Staphylococcus aureus</i>	Vancomycin, gentamicin	Cured	6
	7/Female	Ventricular septal defect	Ist-generation cephalosporin	<i>Propionibacterium acnes</i> , <i>Staphylococcus epidermidis</i>	<i>Propionibacterium acnes</i>	Vancomycin, penicillin	Cured	5
	3/Female	Ventricular septal defect	Ist-generation cephalosporin	<i>Prevotella intermedia</i> , <i>Peptostreptococcus nitrosus</i>	Negative	Imipenem, amoxicillin-clavulanate	Cured	5
	5/Female	Fallot's tetralogy	Ist-generation cephalosporin	<i>Staphylococcus aureus</i> , <i>Bacteroides thetaiotaomicron</i> , <i>Peptostreptococcus previtii</i>	<i>Staphylococcus aureus</i>	Clindamycin, vancomycin	Cured	
	2/Male	Transposition of the great vessel	Penicillin cephalosporin	<i>Escherichia coli</i> , <i>Clostridium perfringens</i>	<i>Escherichia coli</i>	Clindamycin, vancomycin	Cured	
2008 (1)	50/Male	Coronary bypass	Cefamandole	<i>Prevotella melaninogenica</i> , <i>Peptostreptococcus</i> species, <i>Propionibacterium acnes</i>	<i>Prevotella melaninogenica</i>	Ticarcillin-clavulanate, amoxicillin-clavulanate	Cured ^d	This work
				<i>Finegoldia magna</i> ^c	Negative	Metronidazole, amoxicillin	Cured	

^a n, no. of cases reported.

^b Six specimens with anaerobic bacteria only and nine with mixed aerobic, facultative, and anaerobic bacteria over a series of 74 patients with postthoracotomy sternal wound infection.

^c Formerly *Peptostreptococcus magnus*.

^d Only local debridement was performed in this patient.

REFERENCES

1. Akman, C., F. Kantarci, and S. Cetinkaya. 2004. Imaging in mediastinitis: a systematic review based on aetiology. *Clin. Radiol.* **59**:573–585.
2. Bassetti, S., G. Laifer, G. Goy, U. Fluckiger, and R. Frei. 2003. Endocarditis caused by *Finegoldia magna* (formerly *Peptostreptococcus magnus*): diagnosis depends on the blood culture system used. *Diagn. Microbiol. Infect. Dis.* **47**:359–360.
3. Benlolo, S., J. Mateo, L. Raskine, O. Tibourtine, A. Bel, D. Payen, and A. Mebazaa. 2003. Sternal puncture allows an early diagnosis of poststernotomy mediastinitis. *J. Thorac. Cardiovasc. Surg.* **125**:611–617.
4. Brook, I. 1989. Microbiology of postthoracotomy sternal wound infection. *J. Clin. Microbiol.* **27**:806–807.
5. Brook, I. 2001. Recovery of anaerobic bacteria from four children with postthoracotomy sternal wound infection. *Pediatrics* **108**:E17.
6. Brook, I., and E. H. Frazier. 1996. Microbiology of mediastinitis. *Arch. Intern. Med.* **156**:333–336.
7. Cerat, G. A., M. C. McHenry, and F. D. Loop. 1976. Median sternotomy wound infection and anterior mediastinitis caused by *Bacteroides fragilis*. *Chest* **69**:231–232.
8. Czachor, J. S., and H. B. Hawley. 1988. Anaerobic wound infection: *Bacteroides* mediastinitis after cardiovascular surgery. *Heart Lung* **17**:335–338.
9. Fournier, P. E., M. V. La, J. P. Casalta, H. Richet, F. Collart, and D. Raoult. 2008. *Finegoldia magna*, an early post-operative cause of infectious endocarditis: report of two cases and review of the literature. *Anaerobe* **14**:310–312.
10. Lassmann, B., D. R. Gustafson, C. M. Wood, and J. E. Rosenblatt. 2007. Reemergence of anaerobic bacteremia. *Clin. Infect. Dis.* **44**:895–900.
11. Lecuyer, H., J. Audibert, A. Bobigny, C. Eckert, C. Janniere-Nartey, A. Buu-Hoi, J. L. Mainardi, and I. Podglajen. 2007. *Dolosigranulum pigrum* causing nosocomial pneumonia and septicemia. *J. Clin. Microbiol.* **45**:3474–3475.
12. Phelps, R., and R. A. Jacobs. 1985. Purulent pericarditis and mediastinitis due to *Peptococcus magnus*. *JAMA* **254**:947–948.
13. Pien, F. D., R. L. Thompson, and W. J. Martin. 1972. Clinical and bacteriologic studies of anaerobic gram-positive cocci. *Mayo Clin. Proc.* **47**:251–257.
14. San Juan, R., J. M. Aguado, M. J. Lopez, C. Lumbreras, F. Enriquez, F. Sanz, F. Chaves, F. Lopez-Medrano, M. Lizasoain, and J. J. Rufilanchas. 2005. Accuracy of blood culture for early diagnosis of mediastinitis in febrile patients after cardiac surgery. *Eur. J. Clin. Microbiol. Infect. Dis.* **24**:182–189.
15. Smith, P. S., K. Roistacher, G. M. Gordon, A. D. Merav, and R. S. Klein. 1985. Anaerobic mediastinitis complicating median sternotomy. *Am. J. Med. Sci.* **290**:111–113.
16. Topiel, M. S., and G. L. Simon. 1986. Peptococcaceae bacteremia. *Diagn. Microbiol. Infect. Dis.* **4**:109–117.
17. van der Vorm, E. R., A. M. Dondorp, R. J. van Ketel, and J. Dankert. 2000. Apparent culture-negative prosthetic valve endocarditis caused by *Peptostreptococcus magnus*. *J. Clin. Microbiol.* **38**:4640–4642.