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Short communications

Salmonella typhimurium-ENDOCARDITIS SECONDARY TO AN ACQUIRED ENVIRONMENTAL INFECTION: A CASE REPORT

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SUMMARY

A diabetic, cardiopathic and anemic 44-year-old farmer presented with a seven-day history of remittent fever with evening peaks. Two months before he had undergone amputation of the V-finger of the left hand secondary to a phlegmon caused by an agricultural injury. Prior to amputation, anaerobic culture analysis of phlegmon-pus and selective procedures used to isolate Gram-positive cocci and/or *Pseudomonas spp.* resulted negative. The diagnosis of endocarditis was supported by isolation of *S. typhimurium* from blood and by echocardiography showing endocarditic lesions. The source of infection was identified by PCR ribotyping as the same *Salmonella typhimurium* strain that was present, but not sought, both in the anatomic explanted tissues and from blood samples of the patient. The infection was successfully treated with a combination of gentamicin and ampicillin with consequent improvement in the general clinical picture of the patient. We believe this is the first reported case of *S. typhimurium*-endocarditis secondary to a phlegmon resulting from an environmental source of infection.

KEY WORDS: *Salmonella typhimurium*, endocarditis, environmental infection

Salmonella typhimurium, which belongs to the group of the "minor" salmonellosis, is a pathogenic strain which affects animals and humans. In the immunocompetent host, *S. typhimurium* has been reported to induce sporadic and epidemic episodes of acute enteritis related to consumption of animal-derived food. In the weakened and/or immunocompromised host, the risk of infection is also superior for modest infectious loads and onset of sepsis has been described with colonization of extraintestinal organs. The diffusion to other tissues of *Salmonella spp.* is generally secondary to bacteremia or gastroenteritis (Black *et al.*, 1960; Rubin *et al.*, 1977). Endocarditis is a rare example of extra-intestinal infections caused by *Salmonella spp.* In particular, the ability of *S. typhimurium* to adhere and to invade the endothelium - especially if damaged (Cohen *et al.*, 1980) - might enhance the adhesion of the bacterium to the endocardium, thus leading to endocarditis.

CASE REPORT

A 44-year-old farmer was admitted to "San Liberatore" Hospital of Atri, Teramo (Central Italy) in January 1996 with a seven-day history of remittent fever with evening peaks (38 - 39°C). His medical history included chronic renal failure due to chronic pyelonephritis, substitutive hemodialysis treatment for five years, and subsequent renal transplantation; three aortocoronary bypasses secondary to an acute myocardial infarction; insulin-dependent diabetes mellitus. The patient had already been admitted to the Atri Hospital in November 1995 because of abscess drainage due to a left-hand phlegmon, with consequent amputation of V-finger of the left hand. Prior to amputation, anaerobic culture analysis of phlegmon-pus was carried out at the Clinical Pathology Laboratory of Atri Hospital and selective procedures used to isolate Gram-positive cocci and/or *Pseudomonas spp.* resulted negative. Echocardiographic exploration following negative blood-cultures showed no vegetations. The anatomic explanted tissues were transferred to the Clinical Microbiology Laboratory of "G. D'Annunzio" University of Chieti and frozen at –80°C for further studies.

On admission (January 1996), the patient presented asthenia, diarrhea (2-3 daily evacuations), arthralgia and insomnia. Physical examination revealed scanty nutrition and bleeding conditions, moderate respiratory distress, temperature of 38.4°C, heart rate of 93 beats/min, and a blood pressure of 110/60 mmHg. The abdominal examination showed hepatomegaly. Laboratory studies revealed: hematocrit 30%, haemoglobin 10 g/dl; leukocyte count 3,950/mm^3 (58.9% neutrophils, 3.2% monocytes, 0.1% eosinophils, 0.1% basophils); glucose 110 mg/dl; blood urea nitrogen 70 mg/dl; alkaline phosphatase 500 UI/l, GOT 101 UI/l, GPT 53 UI/l and total bilirubin 1.21 mg/dl. Chest radiography showed no pleuroparenchymal alterations in progress, normal-shaped heart with aortic thickening. The electrocardiogram showed diffuse antero-lateral anomalies of repolarization with normal sinus rhythm.

On day 1 after admission, echocardiographic exploration showed mobile vegetations on the posterior mitral valve cusp, chordae tendineae, and aortic semilunar valve (Figure 1). The hemocultures, such as coprocultures and urine cultures, were negative. Therefore, empiric antibiotic therapy with penicillin G (12.000.000 UI/die given intravenously [i.v.]) was initiated.

On day 5 after admission, two of three blood specimens collected on day 3 and day 4, respectively, yielded growth of *Salmonella spp.*, subsequently identified as *S. typhimurium* at the Clinical Microbiology Laboratory of "G. D'Annunzio" University, Chieti where the strain was stored at -80°C until further analysis. Antimicrobial susceptibility tests by Vitek (bioMérieux Italia SpA, Rome, Italy) performed on day 6, indicated sensitivity of the strain to amikacin, ampicillin, carbenicillin, cefoxitin, gentamicin, tetracycline, and tobramycin. Since the patient remained febrile, treatment was switched to gentamicin (2 g/die i.v. for 1 week) and ampicillin (12 g/die given i.v. for 6 weeks) on the basis of the antimicrobial susceptibility testing results. On day 8 the

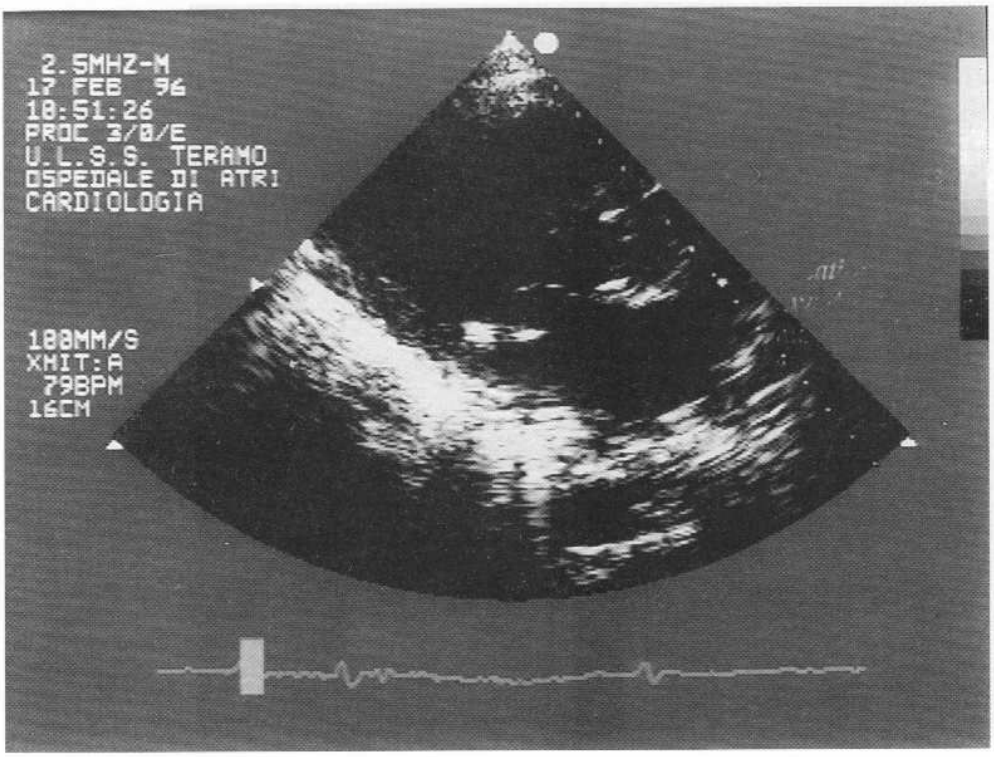

FIGURE 1 - Echocardiography at admission: vegetation-scan be noted on mitral valv and subvalvular space of semilunar valves.

patient became apyretic. Coproculture (day 8) and urine culture (day 9) remained negative.
The improvement in the clinical picture of the patient was confirmed by the sterility of the blood cultures - performed on days 19, 29, and 45. Echocardiographic explorations performed on days 24 and 46 revealed a progressive reduction of the echo mass attached to the subvalvular apparatus (Figure 2). The patient was discharged on the 51st hospital day.
At more detailed history-taking, the patient referred an injury to the V-finger of the left hand in October 1995 when he was working at his farm. We supposed a causal correlation between that injury, the finger phlegmon, and endocarditis. A technique already described by others (Kostman *et al.*, 1992; Nastasi *et al.*, 1995) was succesfully applied to prove this hypothesis. Briefly, the bacterial DNA was extracted from the anatomical explanted tissues, and from the *S. typhimurium* isolated from blood cultures. PCR was carried out as described with primers complementary to conserved regions of the 16S and 23S regions of the rRNA genes (5'-TTGTACACACCGCCCGTCA-3'), and 5'-GGTACCTTAGATGTTTCAGTTC-3'). After 29 cycles of amplification, the products were analyzed on 10% acrylamide gel with silver staining. The PCR patterns observed after electrophoresis resulted identical, thus suggesting a unique origin of both finger and endocardic tissue infection.

DISCUSSION

The diagnostic and therapeutic approach to a patient with infectious endocarditis represents a complex problem that can be resolved only in a situation of full cooperation between the physician and the clinical microbiologist. An early microbiologic diagnosis of infection and the institution of appropriate therapy is important to reduce the risk of subsequent complications that, in the case of *Salmonella*-endocarditis, usually have an ominous prognosis (Cohen *et al.*, 1987). In the present case, the isolation of the pathogen from the bloodstream made it possible to institute prompt

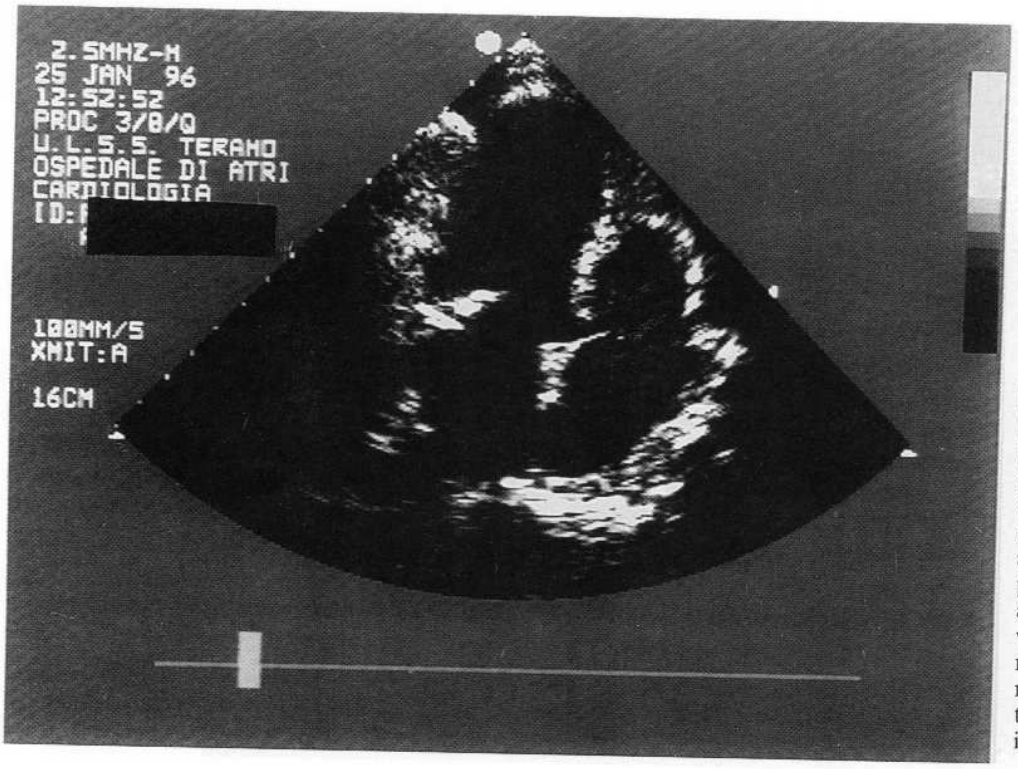

FIGURE 2 - Echocardiography at day 46: a slight reduction of vegetations on valvular and subvalvular apparatus (mitral and semilunar valves) can be noted after correct thevapy of the *Salmonella* infection.

appropriate antibiotic therapy (ampicillin and gentamicin) which led the patient to become afebrile already at 36 hours from the beginning of the therapy, with a consequent improvement in the general clinical picture.

We believe that, in this case because of findings at PCR ribotyping, the primary focus of bacterial invasion was the phlegmon localized on the V-finger of the left hand that produced bacteremia and thus endocarditis. The infection of the endocardium might be facilitated by the poor conditions of the patient - anemia, diabetes mellitus, corticosteroid therapy and, above all, previous cardiac problems - that could have enhanced the blood-dissemination of the microrganism. Moreover, no vegetations were found by echocardiographic exploration performed at admission in November 1995 for the abscess drainage. In our opinion, the dynamics of the infection (endocarditis) seems clear: i) the patient was accidentally exposed to *S. typhimurium* on his hand while working in the farm; ii) the bacterium was not initially recovered because of inappropriate microbiological procedures; iii) bacterial invasion from the primary focus to the bloodstream with consequent bacteremia and subsequent endocarditis was due to inappropriate antibiotic therapy; iv) appropriate antibacterial therapy fully eradicated the *S. typhimurium* infection and improved the clinical conditions.

In conclusion, to the best of our knowledge, the present paper is the first reported case of *S. typhimurium*-endocarditis secondary to a phlegmon resulting from an environmental source of infection.

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