

Diagnostic accuracy of 16S rDNA PCR in bacterial pyomyositis

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Background:

Pyomyositis is a suppurative skeletal muscle infection, which is difficult to diagnose and requires analysis of pus from muscle to establish the microbiological diagnosis. As the diagnosis is often delayed, most patients are under antibiotic therapy during sample collection and cultures are often sterile. Broad-range polymerase chain reaction with 16S ribosomal DNA (16S rDNA PCR) was proven to accurately identify bacterial pathogens in culture-negative samples from patients who have been previously treated with antibiotics. However, 16S rDNA PCR has not been evaluated for the diagnosis of pyomyositis. Here, we prospectively compared 16S rDNA PCR and culture results in patients with pyomyositis

Patients and methods:

All patients admitted to our unit with pyomyositis were included. Pus from muscle was sent to the microbiology laboratory for microscopic analysis, routine culture and to another microbiology laboratory (HEGP) for PCR analysis, which was performed without knowledge of the culture results (SepsiTest kit™, Molzym).

Results:

Between 2007 and 2017, we have included ten patients (mean age: 58 years). Six patients were immunocompromised: HIV infection (N=2), active cancer (N=2), haemodialysis (N=1), cirrhosis (N=1). When the muscle samples were collected, patients had been receiving antibiotic for a median duration of 27 days. 16S rDNA PCR, performed on the pus, identified bacterial species in all cases: *Staphylococcus aureus* (N=3), *Streptococcus* species (N=3), *Clostridium* species (N=2), *Arcanobacterium haemolyticum* (N=1), *Proteus mirabilis* (N=1). In only 5 cases, culture of muscle pus yielded bacterial species, but the results were in agreement with the findings of 16S rDNA PCR. Cultures of blood or synovial fluid from 2 patients yielded bacteria concordant with those identified by 16S rDNA PCR. For the 3 remaining patients, all microbiological analyses, but not 16S rDNA PCR, were negative. However, past medical history or outcomes highly suggested that the findings of the 16S rDNA PCR were true positive results.

Conclusion:

The culture of pus from muscle was negative at the time of diagnosis for 50% of patients with pyomyositis (including all patients with streptococcal infections). Here, we show that 16S rDNA PCR has a greater diagnostic accuracy than routine culture, as it correctly revealed bacterial DNA in culture-negative pus. We recommend 16S rDNA PCR as a diagnostic tool for pyomyositis in that situation.

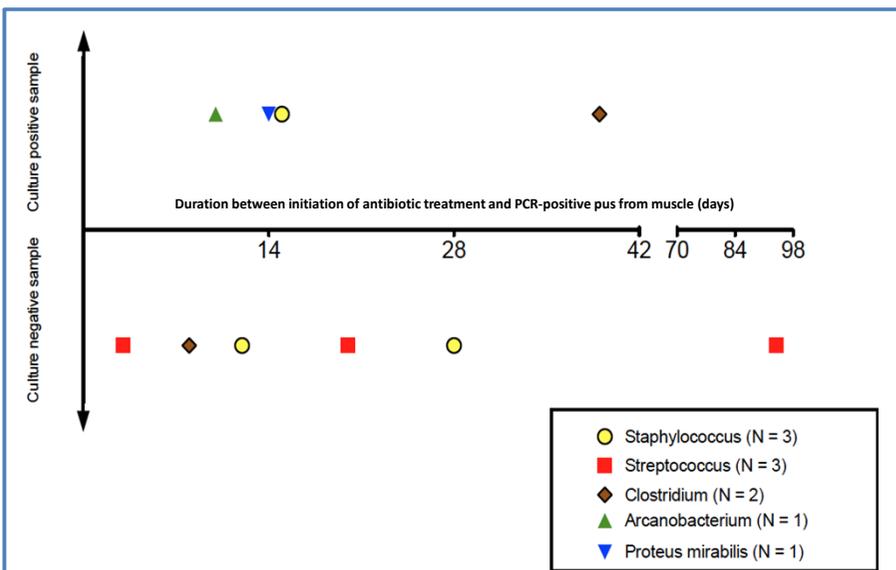


Figure 1 : Results of culture (positive or negative) plotted against the duration between initiation of antibiotic treatment and PCR-positive pus from muscle (days).

Table 1. Patient characteristics, microbiology, PCR results and antibiotic therapy.

	Gender Age (y)	Initial antibiotic regimen	Duration of antibiotic therapy before muscle pus aspiration (d)	Culture result of muscle pus	Culture result of other samples	16S rDNA PCR result from muscle pus	Optimised antibiotic therapy and outcome
1	F/52	AMX/Clav (2 d), OXA (10 d), LVX (3 d)	15	<i>Staphylococcus aureus</i>	None	<i>S. aureus</i>	LVX (16 w) Recovered
2	F/63	LZD (2 d), AMX + LZD (2 d), AMX (10 d)	14	<i>Proteus mirabilis</i>	None	<i>P. mirabilis</i>	OFX (12 w) Recovered
3	H/87	AMC (10 d)	10	<i>Arcanobacterium haemolyticum</i>	None	<i>A. haemolyticum</i>	LVX prolonged antibiotic therapy Recovered
4	M/57	CRO + MTZ (9 d), TZP (7 d), TGC (7 d), AMX (16 d)	39	<i>Clostridium septicum</i>	<i>C. septicum</i> in blood culture	<i>C. septicum</i>	AMX/Clav (8 d) Recovered
5	F/41	LZD + AMX (10 d), AMX/Clav + CLI + GEN (10 d)	20	Sterile	<i>Streptococcus pyogenes</i> in blood culture	<i>S. pyogenes</i>	AMX + CLI (3 w) Recovered
6	F/62	OXA + Genta (4d), OXA (8d)	12	Sterile	<i>S. aureus</i> in blood culture	<i>S. aureus</i>	LVX + R (42 d) recovered
7	F/38	Oxacillin (28 d)	28	Sterile	Negative blood culture, but culture of synovial fluid grew <i>S. aureus</i>	<i>S. aureus</i>	OXA + LVX (4 w) Recovered
8	F/89	AMX (6 w), CRO (6 w), CRO+MTZ (10 d)	94	Sterile	Negative concomitant blood culture, but <i>Streptococcus agalactiae</i> isolated 6 months earlier	<i>S. agalactiae</i>	AMX -prolonged antibiotic therapy Recovered
9	F/58	AMX/Clav (3 d)	3	Sterile	None	<i>Streptococcus spp.</i>	AMX + CLI (8 w) Recovered
10	H/71	HRZ + CLARI (8 d) then MTZ (3 d)	11	Sterile	None	<i>C. perfringens</i>	TZP (19 d) - Fatal

Abbreviation: AMX, amoxicillin; AMX/Clav, amoxicillin-clavulanate acid; CLI, clindamycin; FEP, cefepim; CRO, ceftriaxone; CLARI, clarithromycin; GEN, gentamicin; IPM, imipenem; H, isoniazide; LVX, levofloxacin; LZD, linezolid; MTZ, metronidazole; OFX, ofloxacin; OXA, oxacillin; TZP, piperacillin-tazobactam; Z, pyrazinamide; R, rifampicin; TGC, tigecycline. (d), days. (w), weeks. (y), years.