Letters to the Editor

OXA-58 and IMP-4 Carbapenem-Hydrolyzing \(\beta\)-Lactamases in an Acinetobacter junii Blood Culture Isolate from Australia

Hospital-acquired infections with Acinetobacter spp. have been reported worldwide (13). Success of the organism is attributed to its ability for long-term survival in a hospital environment and its ability to rapidly acquire resistance to antimicrobials (2). Carbapenems have been the agents of choice for serious Acinetobacter sp. infections, but unfortunately the clinical utility of this class of antimicrobial is under threat with the emergence of acquired carbapenemases, particularly from Ambler classes B (metallo-\(\beta\)-lactamases) and D (oxacillinases) (10). Such mechanisms of resistance are being described in many geographic regions, including Australia (11). The class D carbapenemases found in Acinetobacter spp. have previously been divided into two distinct phylogenetic clusters, the OXA-23 cluster (OXA-23 and -27) and the OXA-24 cluster (OXA-24, -25, -26, and -40), with only 60% homology between them (1). More recently, a novel oxacillinase was described in France, OXA-58, in association with Acinetobacter baumannii infections in a burn unit (5, 12). To date, this enzyme has only been reported in Europe (8). A further novel oxacillinase has also been reported from Argentina, OXA-51 (3).

In March 2005, we identified a carbapenem-resistant Acinetobacter junii blood culture isolate. The organism was identified by using the VITEK GNI card (bioMérieux Vitek, Inc., Hazelwood, Mo.) and the result confirmed by the API 20NE system (bioMérieux, Inc., Hazelwood, Mo.). The isolate underwent susceptibility testing using broth microdilution according to CLSI standards (9, 4) and was sensitive to amikacin (MIC, 8 \(\mu\)g/ml), ciprofloxacin (MIC, 0.12 \(\mu\)g/ml), tetracycline (MIC, \(\leq 2 \mu g/ml\)), and polymyxin B (MIC, \(\leq 1 \mu g/ml\)). Intermediate resistance was observed for gentamicin (MIC, 8 \(\mu\)g/ml), piperacillin-tazobactam (MIC, 32 \(\mu\)g/ml), and ampicillin-sulbactam (MIC, 16 \(\mu\)g/ml). Resistance to imipenem, meropenem, ertapenem (all MICs, 8 \(\mu\)g/ml), sulbactam (MIC, 16 \(\mu\)g/ml), cefepime (MIC, \(>16 \mu g/ml\)), ticarcillin-clavulanate (MIC, \(>128 \mu g/ml\)), and tobramycin (MIC, 16 \(\mu\)g/ml) was observed. Further testing, using a double-disk synergy test as described previously (11), identified that EDTA inhibited imipenemase activity, indicating the presence of a metallo-\(\beta\)-lactamase. To confirm the mechanism of carbapenem resistance, PCR was performed using primers specific for the bla\(_{IM\text{P}}\) (14), bla\(_{V\text{IM}}\) (14), and class D carbapenemase genes (OXA-23 and -24 cluster and OXA-58) (1, 12). Amplification products were identified for bla\(_{IM\text{P}}\) and bla\(_{OXA-58}\). Nucleotide sequencing confirmed the presence of the bla\(_{OXA-58}\) and bla\(_{IM\text{P}-4}\) genes, with a complete sequence identified for each respective gene.

To our knowledge, this is the first report of both an OXA-58 outside of Europe and an Acinetobacter sp. carrying an OXA-58 and an IMP-4 gene. A. junii is a rare cause of disease, although documented cases of septicaemia in adult and pediatriec patients have been described (7). Also, bla\(_{OXA-58}\) has been reported in a single isolate of A. junii (8). The bla\(_{OXA-58}\) gene identified in France was found on a 30-kb plasmid, but in vitro conjugation experiments were unsuccessful using an A. baumannii recipient strain (5). Recently, it has been shown that OXA-58 activity contributes significantly to carbapenem resistance in A. baumannii, especially when additional efflux mechanisms are expressed (6). Our findings of multiple carbapenem-hydrolyzing \(\beta\)-lactamase genes in Acinetobacter spp. is worrying, the potential for spread and therapeutic failure being the primary concern. Further research is required to identify the genetic context of these genes and therefore understand the pathogenesis of spread. Incorporating strict infection control practices with controlled carbapenem use seems prudent at this stage.

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REFERENCES


399


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