CASE REPORT

A community-acquired methicillin-resistant *Staphylococcus aureus* liver abscess

Vivien WY Wong 黃慧妍
YS Cheung 張宇新
John Wong 黃　創
KF Lee 李傑輝
Paul BS Lai 賴寶山

Liver abscesses caused by community-acquired methicillin-resistant *Staphylococcus aureus* are rarely reported. We report such a case in a 25-year-old man who presented with an intermittent fever. He had a history of prolonged antibiotic use for acne and skin abscesses. The liver abscess was successfully treated with percutaneous drainage and a prolonged course of linezolid. To our knowledge, this is the first reported case of a community-acquired methicillin-resistant *Staphylococcus aureus* liver abscess in Hong Kong, demonstrating the increasing threat posed by this multidrug-resistant organism. This case also suggests that a different epidemiology and route of infection may apply to community-acquired methicillin-resistant *Staphylococcus aureus* liver abscesses in contrast to the more common pyogenic liver abscesses.

Introduction

A pyogenic liver abscess is a major hepatobiliary infection that carries significant morbidity and mortality. The dominant aetiology has changed over the years, from suppurative appendicitis during the era before antibiotic usage to different hepatobiliary and colonic pathologies in recent years. These abscesses are usually polymicrobial, with *Escherichia coli*, *Klebsiella* species and *Bacteroides* the most common pathogens. Most can be successfully treated with antibiotics selected after the pathogens and their respective sensitivities have been determined by culturing materials drained percutaneously from the abscess. Surgical drainage may be required if this fails.

Staphylococcus aureus is an uncommon cause of liver abscess (<10% of all pyogenic liver abscesses[1]), with the methicillin-resistant strain appearing in even fewer cases. In those cases, the bacteria are predominantly hospital-acquired, but the number of community-acquired strains is rising. Because community-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) was first found in skin and soft tissue infections, communities worldwide are concerned about its susceptibility to a narrow spectrum of antibiotics, and fear the development of an antibiotic-resistant 'superbug'. In Hong Kong, any infection caused by this bacterial species must be reported and the public is being educated about the need to use antibiotics sparingly. Skin and soft tissue remain the major routes of infection, but involvement of other sites can be serious, even fatal.[2,3] Such infections may affect the healthy population as well. In this report, we present a case of community-acquired MRSA liver abscess in a young, fit man.

Case report

A 25-year-old man with good past health was admitted in February 2009 with a 10-day history of intermittent fever associated with sweating. He had used antibiotics within 6 months of the admission, including self-prescription of clarithromycin for 2 months to treat acne, and a 1-week course of amoxicillin/clavulanate for a left thigh abscess. No specimens were cultured before these infections were treated. A physical examination found that his abdomen was soft with no palpable masses. Blood tests revealed an elevated alkaline phosphatase level of 194 IU/L associated with neutrophilic leukocytosis (17.7 x 10^9 /L, neutrophils 83%), an elevated C-reactive protein level (301.1 mg/L), and an elevated erythrocyte sedimentation rate (115 mm/h). Blood cultures were negative. Ultrasound showed a multi-loculated liver abscess in segment 6 measuring 7.6 x 5.1 x 5.5 cm (Fig 1). He was managed with percutaneous drainage, which yielded 5 mL of thick brownish pus. Computed tomography showed a residual abscess at segment 6 of liver around 1 week afterwards (Fig 2).

He was managed with percutaneous drainage, which yielded 5 mL of thick brownish pus. The pus was cultured and grew MRSA. Genotyping confirmed that the strain was community-acquired (Staphylococcal cassette chromosome *mec* type V; Panton-Valentine Leucocidin gene positive). Blood, urine, and throat swabs were cultured but were negative for MRSA. Magnetic resonance cholangiopancreatography and a barium enema showed no

Key words
Community-acquired infections; Liver abscess; Methicillin resistance; *Staphylococcus aureus*; Vancomycin

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Division of Hepatobiliary and Pancreatic Surgery, Department of Surgery, The Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong
VWY Wong, MRCS(Ed)
YS Cheung, FRCSEd (Gen)
J Wong, FRCSEd (Gen)
KF Lee, FRCSEd (Gen)
PBS Lai, MD, FRCSEd (Gen)

Correspondence to: Prof PBS Lai
Email: paullai@surgery.cuhk.edu.hk

社區型Methicillin抗藥性金黃葡萄球菌肝膿瘍

關於社區型methicillin抗藥性金黃葡萄球菌肝膿瘍的病例報告很罕見。本文報告一名25歲出現陣發熱的男子，曾因暗瘡及皮膚出現膿瘡而長期服用抗生素，其後接受經皮膚引流及長時間服用linezolid，其肝膿瘍終得治癒。據我們所知，本病例是首宗在香港報告的社區型methicillin抗藥性金黃葡萄球菌肝膿瘍，突顯多重抗藥性微生物漸漸對我們構成威脅。本病例亦顯示社區型methicillin抗藥性金黃葡萄球菌肝膿瘍與一般的化膿性肝膿瘍相比，也可以有另類的發病及傳播途徑。

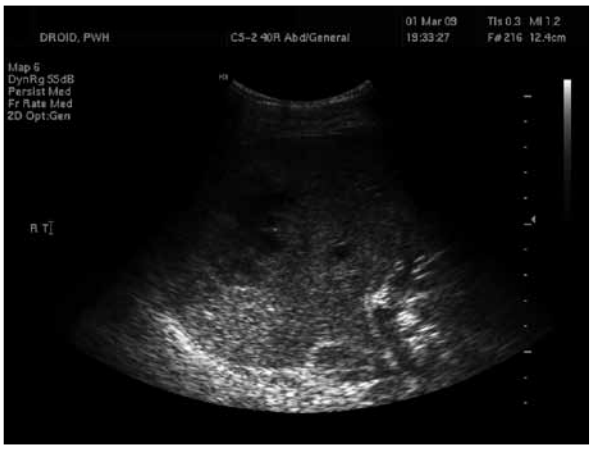

FIG 1. Ultrasound image showing a 7.6 x 5.1 x 5.5 cm heterogeneous mass lesion in segment 6/7 of the liver, with a partly liquefied component

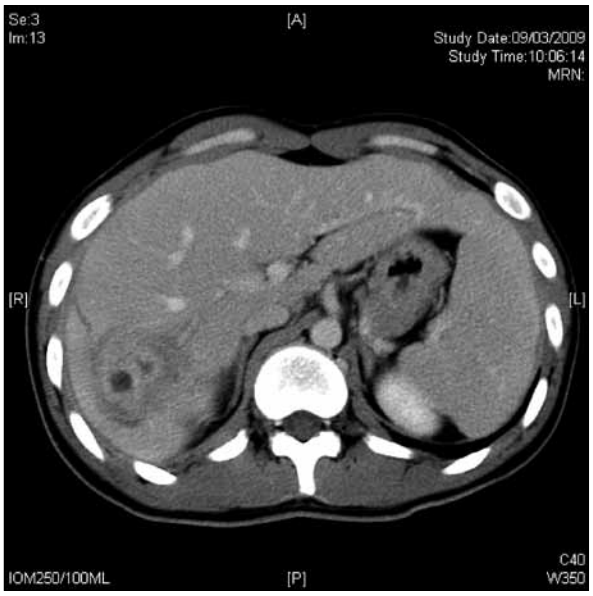

FIG 2. Computed tomographic image showing a rim-enhancing lesion suggestive of residual liver abscess after drainage and vancomycin treatment

evidence of hepatobiliary or colonic pathology. He had no evidence of the human immunodeficiency virus.

The patient was commenced on vancomycin but continued to have low-grade fever and after 2 weeks of treatment his C-reactive protein was elevated, despite the achievement and maintenance of a therapeutic serum concentration of the drug. His condition improved after the vancomycin was replaced with linezolid, so he was discharged with a 6-week course of oral linezolid. Follow-up computed tomography performed 2 months after the initial percutaneous drainage showed resolution of the liver abscess.

Discussion

Staphylococcus aureus is commonly found on human skin and mucosae. Around one third of the healthy population carries the bacteria in their nasal cavity or skin with no evidence of infection. On the other hand, this bacterium can cause skin infections, wound infections, food poisoning, pneumonia, and bacteraemia. Beta-lactam antibiotics are generally effective for managing methicillin-sensitive *S aureus* infections. The appearance of the methicillin-resistant strains is attracting attention as they are resistant to traditional anti-staphylococcal beta-lactam antibiotics, and the use of effective antibiotics, such as vancomycin, may cause nephrotoxicity. The emergence of MRSA has also alerted clinicians to the possibility that further resistance to these potent antibiotics may develop. Vancomycin-intermediate or -resistant *S aureus* has been isolated in various countries including Japan since 1996.[4] It has been proposed that the mechanism of this resistance is production and accumulation of excessive amounts of cell-wall peptidoglycan.[5]

In Hong Kong, hospital-acquired MRSA infections are more common than the community-acquired strain. Community-acquired MRSA infection was first reported in Hong Kong in 2004.[6] Its incidence, however, has increased since it became a statutory notifiable disease in January 2007.[7] Infections most commonly involve skin or soft tissue (99%), of which around 30% involve the lower limbs, followed by the buttocks, groin, and perineum.[8] Infections involving other organs are rare but can be fatal.[9] Previously notified cases include lower respiratory tract infections and meningitis. To our knowledge, the case we report here is the first report of a liver abscess caused by this type of bacteria in Hong Kong.

Pyogenic liver abscesses are usually polymicrobial. *Staphylococcus aureus* has been a reported pathogen in less than 10% of all hepatic abscesses.[1] Twenty case reports described liver abscesses caused by MRSA, and only three of these described the community-acquired strain.[10-12]

Healthy people do not seem to be protected from community-acquired MRSA liver abscesses. One of the three reports in the literature described such an infection in a young, fit patient. The report suggested that community-acquired MRSA liver

abscesses may have a severe clinical course, requiring surgical management, and that such aggressive liver abscesses may be secondary to skin and soft tissue infections.[12] In our case, the patient also had a history of skin infections treated with prolonged antibiotic courses. Nevertheless, his clinical course was not so severe; percutaneous drainage and antibiotics achieved an effective resolution.

In our patients, linezolid was more effective than vancomycin. Reports have shown that linezolid has a similar clinical or microbiological cure rate to vancomycin for MRSA infections involving skin, soft tissue, and other organ infections and also has similar adverse effect rates.[13,14] It is well tolerated by those in whom vancomycin is nephrotoxic or who lack intravenous access.[15,16] It can be administered intravenously or orally, allowing a more flexible treatment plan. Moreover, the development of new-onset resistance and cross-resistance is thought to be less likely with linezolid, due to its ability to inhibit protein synthesis early by binding to ribosomal subunits. This is a unique mechanism of action not seen in any other currently available antimicrobial agents.[17] Nevertheless, attention should be paid to the possible development of peripheral neuropathy, toxic optical neuropathy, myelosuppression, and hyperlactataemia. Neuropathies have been reported after prolonged linezolid therapy (>28 days), and myelosuppression may occur as pancytopenia, or more commonly as isolated cytopenia, after 14 days of therapy.[18] Most of these side-effects subside upon discontinuation of linezolid, but recovery from peripheral neuropathy is incomplete, with residual paraesthesia in the distal extremities.[18]

Conclusion

This case illustrates how community-acquired MRSA is posing an increasing threat to our population. Even young, fit patients may be affected, and previous skin infection managed with prolonged antibiotic use seems to be a predisposing factor. Liver abscesses caused by community-acquired MRSA may follow a spectrum of clinical courses. Our patient had a relatively mild clinical course; his abscess was effectively managed with percutaneous drainage and a prolonged course of appropriate antibiotics. Nevertheless there have been reports of virulent disease requiring surgical intervention. Infection of MRSA should be suspected if a liver abscess does not respond to the usual antibiotic regimen. In confirmed cases, linezolid may be a suitable alternative if vancomycin is not tolerated or becomes ineffective.

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