Case Report
Étude de cas

Clenched-fist injury complicated by methicillin-resistant *Staphylococcus aureus*

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Hand infections are a common sequela of clenched-fist injuries. The majority of these infections are due to *Staphylococcus* and *Streptococcus* species. Methicillin-resistant *Staphylococcus aureus* (MRSA) is increasingly being isolated in Canadian health care facilities. In addition, MRSA now needs to be considered in community acquired hand infections that fail to respond to common empiric therapy. A 51-year-old man with MRSA due to a hand injury was treated successfully with vancomycin. The prevalence, mechanism of resistance and treatment of MRSA are briefly reviewed.

Les blessures subies le poing fermé entraînent souvent des infections aux mains. La majorité de ces infections sont causées par les espèces *Staphylococcus* et *Streptococcus*. Des établissements de santé du Canada isolent de plus en plus souvent le *Staphylococcus aureus* résistant à la méthicilline (SARM). Il faut en outre envisager maintenant le SARM dans les cas d'infections à la main d'origine communautaire qui ne réagissent pas à un traitement empirique ordinaire. Un homme de 51 ans qui avait du SARM à la suite d'une blessure à la main a été traité avec succès avec de la vancomycine. Les auteurs revoient brièvement la prévalence, le mécanisme de résistance et le traitement du SARM.

Infection is a common complication of human bite wounds to the hand. The majority of these infections are due to *Staphylococcus* and *Streptococcus* species, although a polymicrobial infection is not uncommon.[1] Methicillin-resistant *Staphylococcus aureus* (MRSA) has been recognized as a serious pathogen since the late 1960s but has been reported only once as a complication of a human bite injury to the hand.[2]

Case report

A 51-year-old man was assessed in the Emergency Department for an infection on the dorsum of his right hand at the third metacarpophalangeal (MCP) joint. This injury had occurred 2 weeks earlier during a struggle in which his hand had struck the teeth of another person. Initial treatment consisted of orally administered penicillin for 1 week and then admission to hospital for 1 week of therapy with ampicillin and gentamicin to treat a cellulitis that extended from hand to elbow. He was discharged from hospital after the cellulitis settled with a prescription for penicillin to be taken orally. No tissue was cultured during this hospitalization. Two days after discharge he presented at our institution.

Physical examination revealed a 2-cm laceration over the dorsum of the long finger MCP. The wound contained surgical packing. Pus was draining freely from the wound. There was marked cellulitis and the hand was diffusely tender to palpation. Radiographs demonstrated soft-tissue swelling but no bony abnormalities, foreign bodies or gas in the tissues. Intravenous antibiotic therapy was begun with penicillin (4 million units every 4 hours) and cloxacillin (1 g every 6 hours), and the patient underwent operative irrigation and débridement. Operative findings were tissue necrosis involving the the peripheral edges of the extensor tendon, necrosis of surrounding soft tissues and perforation of the joint capsule, with a small area of bony injury proximal to the metacarpal articular surface. Cultures

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from the operating room were positive for MRSA sensitive to vancomycin, ciprofloxacin and trimethoprim sulfamethoxazole. Treatment was begun intravenously with vancomycin. The patient was discharged from hospital on the fourth postoperative day and a home intravenous program instituted. Vancomycin therapy was continued for 5 weeks. The wound healed without complication, but there was some mild residual stiffness of the MCP. Long-term follow-up at 18 months revealed loss of 10° of MCP flexion compared with the contralateral side. No changes were noted on the radiograph.

Discussion

The incidence of MRSA has increased in communities and health care facilities in Canada and the United States since the mid-1970s. The percentage of *S. aureus* resistant to methicillin among all hospitals surveyed by the National Nosocomial Infections Surveillance System rose from 2.4% in 1975 to 29% in 1991.[3]

S. aureus has a long history of antibiotic resistance. β-lactam penicillins, by binding to membrane-bound enzymes, block the synthesis of bacterial cell-wall mucopeptide, thereby producing cell-wall instability. β-lactamases, produced by bacteria, rendered the penicillins less effective. The advantage of methicillin is that it is stable in the presence of β-lactamases. Methicillin, like β-lactam penicillins, works by disrupting cell-wall synthesis after linking with membrane-bound receptors. Resistance to methicillin is conferred on bacteria by the possession of unique, low-affinity membrane receptors.[4]

MRSA may still be sensitive to gentamicin or quinolones such as ciprofloxacin. However, development of resistance to these drugs can quickly occur. Although gentamicin sensitivity was not tested on our isolate, this may have explained the initial response with secondary failure.

Vancomycin is currently the drug of choice for MRSA infection. To date there are no reported isolates of vancomycin-resistant MRSA; however, vancomycin resistance has developed in enterococcal and coagulase-negative *Staphylococcus*. This endangers the future usefulness of vancomycin as there is the potential for transfer of resistance genes from coagulase-negative *Staphylococcus* to *S. aureus*.[5]

S. aureus is the most common isolate from hand infections secondary to human bites.[1,6,7] MRSA may rarely present as an infection of the hand resistant to common antibiotic regimens. MRSA hand infections will likely become more common as this pathogen increases in prevalence.

Previously confined to hospital acquired infections, MRSA is now seen in community acquired infections and should be considered in treatment failures of empiric therapy. Obtaining tissue culture results is critical as a guide to the choice of therapy in these difficult infections.

References

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