Tokai J Exp Clin Med., Vol. 26, No. 4-6 , pp.123-125, 2001

A Case of Rupture of the Internal Jugular Vein Caused by Postoperative Infection of Functional Neck Dissection

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(Received November 17, 2001; Accepted November 30, 2001)

A 68-year old diabetic man with gingival cancer of the lower jaw underwent resection of the mandible and functional neck dissection. Swabs of a postoperative wound infection revealed methicillin-resistant *Staphylococcus aureus* (MRSA). The wound was irrigated, and antibiotics administered. The pathogens isolated were sensitive to the antibiotics used, but the infection failed to respond to treatment. Bleeding ensued on the 14th postoperative day (#14POD), when the wound was opened to reveal thrombosis and rupture of the right internal jugular vein. The patient's condition improved after ligation and surgical debridement of the right internal jugular vein. Our experience underlines the importance of early radiological investigation for possible thrombus formation in the internal jugular vein in cases of postoperative wound infection follows functional neck dissection with conservation of the internal jugular vein. It is also important to actively treat this condition surgically, including ligation of internal jugular vein for suppressing inflammation.

Key words : Jugular Vein, Rupture, Thrombosis, Infection, MRSA

INTRODUCTION

Serious deep neck infections are known to cause thrombosis of internal jugular vein, with a number of reports of Lemierre's syndrome [1, 2]. Thrombosis of the internal jugular vein due to postoperative infection following functional neck dissection has been reported [3, 4], but rupture of the vein has not previously been reported. In this report, we present a patient with diabetes mellitus that developed a postoperative infection, with methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa* the causative organisms, following functional neck dissection. This was subsequently further complicated by thrombosis and rupture of the internal jugular vein.

CASE REPORT

A 68-year-old man attended the Tokai University Hospital on February 5, 1997, complaining of 1 month of gingival swelling of the lower jaw. He had a history of surgical treatment for carcinoma of the sigmoid colon at the age of 66. Oral examination revealed a 38 mm (12 mm gingival mass in the right lower jaw. Ortho-pantomography showed bone resorption at the alveolar process. A painless mass with a maximum diameter of 20 mm was palpable in the right submandibular lymph node. This was biopsied, yielding the histopathological diagnosis of squamous cell carcinoma. The patient was diagnosed with gingival carcinoma of the lower jaw T2N1M0. Laboratory investigations on admission gave an elevated fasting blood sugar level of 133 mg/dl, and HbA1c of 7.3%. The 75G glucose tolerance test gave a maximum value of 257 mg/dl after 60 minutes, leading to the diagnosis of diabetes mellitus. A sliding scale of insulin was commenced for the control of blood sugar.

The patient underwent surgery under general anesthesia on March 5. A Y-shaped incision was made in the neck, conserving the internal jugular vein and accessory nerve, and the neck dissection performed down to level III cervical lymph nodes (American Joint Committee on Cancer). The

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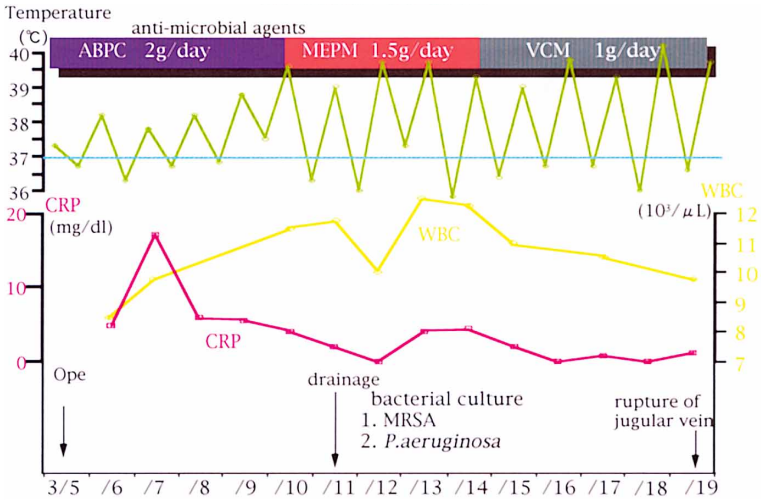
Table 1 Summary of clinical course



CRP: c-reactive protein WBC: white blood cell count
MRSA: methicillin-resistant Staphylococcus aureus
ABPC: ampicillin MEPM: meropenem VCM: vancomycin

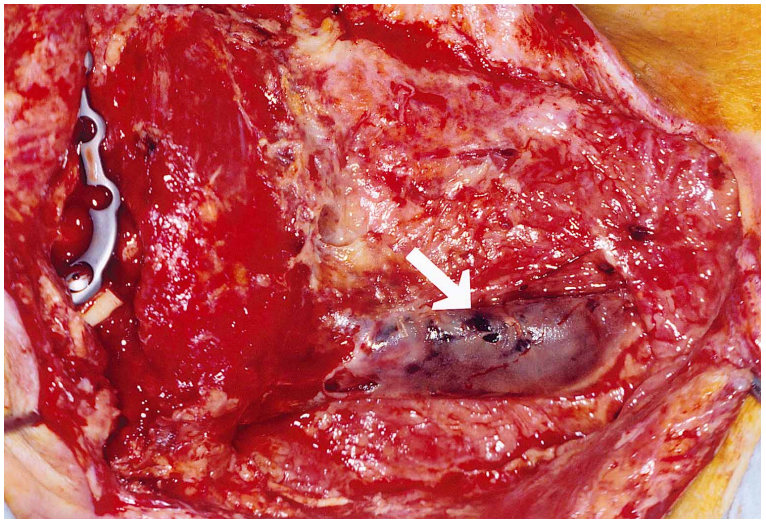


Fig. 1 Surgical wound at March 19. Rapture of internal jugular vein (arrow) and necrosis of the deep neck fascia were found.

mandibular region containing the mass was resected, together with the dissected neck tissues. The resected mandible was then reconstructed using a titanium plate and a rectus abdominus free flap. The postoperative course is summarized in Table 1. The patient developed a refractory fever reaching 40℃ on March 6 (#1POD) and thereafter. No wound infection was detected until the continuous suction drain was removed on March 9 (#4POD), and a pussy discharge was observed from the drain site on March 11 (#6POD). The surgical wound on the neck was partly opened to insert a drain. The antibiotic was changed from ampicillin to meropenem. Despite twice daily local irrigation thereafter, the patient continued to have a large amount of pussy discharge. Wound swab cultures MRSA, and the antibiotic was changed to vancomycin. The

patient's white blood cell count and c-reactive protein (CRP) improved, but the neck wound continued to discharge pus. On March 19 (#14POD), due to some bleeding from the mandibular drain and continued discharge of pus, the patient underwent surgical debridement.

Opening the wound revealed necrosis of the deep neck fascia surrounding the right internal jugular vein. Thrombus was identified in the internal jugular vein and the vein wall was ruptured (Fig. 1), so the right internal jugular vein was ligated and removed. The mandibular reconstruction plate was also removed, the necrotic tissue of the deep neck fascia resected, and a drain inserted. Postoperatively, the infection resolved with concomitant vancomycin and meropenem and local irrigation. On April 25, he was discharged. 4 years and 8 months after surgery, the patient is doing well, and continues to attend the hospital as an outpatient.

DISCUSSION

The main pathogens detected in wound swabs in this patient were MRSA and *P. aeruginosa*. Both were sensitive to the initial antibiotics, ampicillin and meropenem. The wound infection failed to respond despite frequent local irrigation commenced immediately after detection of the infection. Findings at the time of debridement were of necrosis in the deep neck fascia. It has been reported that enzymes and toxins produced by Gram negative rods such as *P. aeruginosa*, and MRSA not only cause direct tissue disturbance, but also induce excessive production of inflammatory cytokines, which are known to be damaging to tissues [5, 6]. Experiments with animals have demonstrated that these cytokines are responsible for thrombus formation and tissue destruction [7]. There have been a number of reports of thrombosis and rupture of the internal jugular vein in association with deep neck infection, known clinically as Lemierre's syndrome [1, 2].

Thrombosis of the internal jugular vein after conservative neck dissection is considered to occur mainly due to infection [1, 4]. Leontsinis *et al.* [3] confirmed occlusion in 8 out of 19 patients, and infection in 5 out of these 8 patients as evaluated by retrograde venography. In 3 patients, no particular cause was found, for which they pointed out possible causes as endothelial trauma and reduced blood flow under general anesthesia. Although thrombosis of internal jugular vein associated with infection after conservative neck dissection has been reported [3, 4], our search of the literature revealed no reports of rupture of the vein. We were unable to control the infection, in spite of commencing drainage and irrigation of the wound as soon as the infection was detected, and treatment with antibiotics the detected bacteria were sensitive to. The underlying disease of diabetes mellitus was considered to be a contributing factor to the infection, which resulted in thrombus formation and rupture of the internal jugular vein at the site of the postoperative surgical wound, through a mechanism similar to that in Lemierre's syndrome.

These findings underline the importance of early radiological investigation of possible thrombus formation in the internal jugular vein in cases of postoperative wound infection following functional neck dissection with conservation of the internal jugular vein. It is also important to actively treat this condition surgically, including ligation of internal jugular vein for suppressing inflammation.

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