Surgical strategy for tubercular abscess in the chest wall: experience of 120 cases

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Abstract

OBJECTIVES: We aim to optimize surgical strategy to decrease relapse of tubercular abscess in the chest wall (TACW).

METHODS: The records of 120 patients who underwent surgical treatment for TACW from May 2005 to March 2011 were retrospectively reviewed. We conducted the following surgical treatment as ‘6C + A’ by abbreviating the first alphabet of each step: (i) careful exploration of the abscess; (ii) complete resection; (iii) cavity washing using sodium bicarbonate solution; (iv) coverage using muscle flap; (v) continuous suction and drainage; (vi) compression dressing and (vii) anti-tuberculosis medication.

RESULTS: One hundred and thirteen cases were discharged for rehabilitation with the first stage wound healing (113/120). Four cases postoperatively suffered from subcutaneous fistula which was healed after dressing changes for 1–2 months. Three patients with an abscess relapse underwent the second operation 2 months after the first operation. Follow-ups ranged from 2 months to 6 years and demonstrated no recurrence.

CONCLUSIONS: We deem the surgical procedures ‘6C + A’ effective to obviate relapse of TACW.

Keywords: Tubercular abscess • Chest wall • Relapse

INTRODUCTION

The incidence of tuberculosis has decreased due to the application of effective anti-tuberculosis drugs, and tubercular abscesses in the chest wall (TACW) were thought to be a rare disease in western countries [1]. However, the incidence of chest wall disease is still high in some areas of the world. For instance, in China, Yao [2] and Zhu [3] reported 712 and 423 chest wall tuberculosis cases, respectively. And the importance of the disease is also growing in western countries, due to the increasing number of immune-compromised patients as well as immigrants from endemic areas [4]. Certainly, TACW requires surgical resection in most cases [1]. However, the recurrence rates were unsatisfactorily reported to be 13.8 and 7.8% [4, 5]. Thus far, various surgical strategies have been recommended, including complete and extensive resection of the abscess [4, 6]. However, the case numbers in those reports are too small. Further, more experience of surgical treatment should be accumulated to improve the therapeutic effect. Herein, we retrospectively present our experience regarding the surgical treatment of TACW in 120 cases. And we aim to optimize surgical strategy to decrease recurrence rates of TACW.

PATIENTS AND METHODS

We retrospectively reviewed the records of 120 patients who underwent surgical treatment for TACW at Daping Hospital from May 2005 to March 2011. Preoperative diagnosis was made based on history taking, physical examinations, assaying five antibodies against tuberculoprotein (LAM, CFP10, ESAT-6 and 2 lipopolysaccharide antigens migrating at 38 and 16 kDa), and computed tomography (CT) of the chest (Fig. 1A and B). The demographic data are shown in Table 1. The pathological diagnosis was confirmed postoperatively. The study protocol as well as ethical issues were reviewed and approved by the Daping Hospital Institutional Review Board, and informed consents were obtained from all patients who agreed to participate in the study.

Preoperatively, all the patients had received anti-tuberculosis medication including isoniazid (0.3 g, OD), rifampicin (0.45 g, OD) and ethambutol (750 mg, OD) for 2 weeks. Needle aspiration was performed in 26 patients to reduce the tension of the abscess. Simultaneously, the aspiration specimens were obtained for acid-fast staining.

Intraoperatively, general anaesthesia was performed and the operations were performed on lateral or dorsal decubitus. We conducted the following surgical treatment as ‘6C + A’ by abbreviating the first letter of each step:

(i) Careful exploration of the abscess: after performing incision over the length of the abscess, we explored and inspected the intercostal space carefully to determine the possible underlying fistula.

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(ii) Complete resection: all the suspected necrotic tissue should be debrided. Once the fistula was confirmed, the roofed ribs should be removed. Simultaneously, those ribs with rough periosteum, gray cortical substance or suspected necrosis should be removed to normal broken ends. Similarly, partial resection of the sternum was performed once the underlying fistula was confirmed. Totally, three, two and one rib were removed in 21, 38 and 42 patients, respectively. Among them, 32 patients also underwent partial resection of the sternum.

(iii) Cavity washing with sodium bicarbonate solution: the residual cavity was washed repeatedly and thoroughly by using 5% sodium bicarbonate solution.

(iv) Coverage using muscle flap: the residual cavity was covered and filled with the muscle flap constructed by the adjacent muscles to the defects, such as the major pectoral, anterior serratus or latissimus dorsi muscles). Wide pedicle and blood supplies to the muscle flap should be maintained carefully. And the muscle flap can be oversewn to basal tissues of cavity.

(v) Continuous suction and drainage: continuous suction was applied to the drain (Fig. 2A and B) which was placed in the residual cavity (suction and drainage was discontinued within 10 postoperative days).

(vi) Compression dressing: the incision was sutured after the necrotic skin was removed. If there was excessive tension, we usually dissected the underlying subcutaneous tissues to liberate and expand the skin. The wounds were tightly pressed by using compression dressings until 3–4 postoperative weeks.

(vii) Anti-tuberculosis medication: postoperatively, all the patients received anti-tuberculosis drugs, including isoniazid (0.3 g, OD), rifampicin (0.45 g, OD) and ethambutol (750 mg, OD) for 3–6 months.

RESULTS

Of the 120 cases, 113 were discharged for rehabilitation with the first stage wound healing (Fig. 3A and B). Four cases postoperatively suffered from subcutaneous fistula which healed after dressing changes for 1–2 months. Three patients with an abscess
relapse underwent the second operation 2 months after the first operation. During the second operation, we carefully detected and unroofed the rib, and debrided the underlying necrotic tissue which was omitted in the first operation. Sixteen patients were lost for follow-up. Follow-ups ranged from 2 months to 6 years and showed that there was no recurrence in the 104 cases.

DISCUSSION

TACW is an infrequent finding in western countries [7-9]. There are three mechanisms in the pathogenesis and spread of TACW: direct extension from the underlying pleural or pulmonary parenchymal disease [10], haematogenous dissemination associated with the activation of a dormant tuberculous focus [11] and direct extension from lymphadenitis of the chest wall [12, 13]. In the series, 71 cases (71/120) had antecedent or present tuberculous lesions, including pulmonary, pleural, mammary and cervical lymphatic tuberculosis. The aforementioned lesions were confined to one hemithorax to TACW in 48 cases (48/71), the other hemithorax in 13 cases (13/71) and bithorax in 10 cases (10/71). The association suggested the probable mechanisms of direct extension from the underlying pleuritis, pulmonary tuberculosis, lymphadenitis or tuberculous mammitis.

Conventionally, some authors established diagnosis by bacteriological examinations for detecting tubercle bacillus, polymerase chain reaction or culture of aspiration specimens [1, 10, 12, 14]. However, the bacteriological examinations of needle aspiration specimens are not always reliable [6]. In this series, we conducted needle aspiration in order to reduce the tension of abscess, instead of trying to obtain aetiological factor. Indeed, acid-fast staining of aspiration specimens was negative in all the patients who underwent needle aspiration. In addition, the puncture point should be located laterally and upwardly on the abscess, to obviate leakage of pus and formation of fistulae.

Recently, the development of microarray and protein chip offers a new technique and approach for serodiagnosis of tuberculosis. In this series, by using protein chips, we detected tuberculosis antigens which offer high specificity and sensitivity (100%), but low sensitivity (18%) in serodiagnosis [15]. The lipopolysaccharide protein migrating at 38 and 16 kDa are specific mycobacterium tuberculosis antigens which offer high specificity in serodiagnosis [16]. CFP10 and ESAT-6 small molecular protein with strong immunological activity, which can be recognized by T cells in the early stage of infection [17]. As a result, we combined and assayed the five proteins. Indeed, the positive rate of combined assay came to be 90.8% (109/120) in the series.

Conservative therapy as anti-tuberculosis chemotherapy has been thought as an efficacious treatment for TACW by few authors [8, 10, 12]. However, the number of patients in those studies was rather small and the follow-up was too short. In Kim’s report [4], 29 patients were treated with anti-tuberculous medication preoperatively for 1-8 months. However, all the lesions did not heal and eventually needed surgical resection. As a result, we deem surgical resection an efficacious treatment for TACW. However, preoperative anti-tuberculosis medication is also important to obviate the risk of tuberculosis dissemination following the operation.

We performed the following surgical procedures: (i) careful exploration of the abscess; (ii) complete resection; (iii) cavity washing using sodium bicarbonate solution; (iv) coverage using muscle flap; (v) continuous suction and drainage; (vi) compression dressing; (vii) anti-tuberculosis medication. We abbreviate the procedures with the first alphabet of each step as ‘6C + A’.

(i) Careful exploration and complete resection of TACW is essential for the prevention and obviation of relapse. During the second operation in the three patients suffering from an abscess relapse, we indeed found the underlying necrotic tissue omitted in the first operation. Thereafter, we unroofed the rib and debrided the necrotic tissue. However, the procedure should be determined on situation and improvisation. For the sake of obviating the deformity or instability of chest wall, we endeavoured to make the extent of resection as small as possible, while removing all the infected tissue. For example, the size of defect after partial resection of the sternum is not supposed to exceed the sternal midline.

(ii) Mycobacterium tuberculosis thrives in pH condition ranged from 6.8 to 7.2. Residual cavity washing using sodium bicarbonate solution can change local pH value promptly and inhibit the propagation of tuberculosis. Besides, our preclinical study suggested that sodium bicarbonate solution can dissolve and eliminate mucoprotein (data not shown).

(iii) We strongly recommend potential soft tissue coverage using the adjacent muscles to the defects, such as the major pectoral, anterior serratus or latissimus dorsi muscles. All the abovementioned muscles are likely to offer nice muscle flaps due to muscular thickness and abundant blood supply. Thereafter, continuous suction was applied to the drainage placed in residual cavity, for the sake of eliminating accumulation of tissue effusion. And the drainage could be gradually withdrawn within 10 days. Once subcutaneous fluid was found to have accumulated, needle aspiration should be performed immediately. Continuous compression and dressing until postoperative weeks three to four is very important and we should check the pressure of the dressing every week. All the aforesaid procedures are supposed to eliminate residual space and obviate tubercle bacillus survivor.

(iv) Additionally, postoperative anti-tuberculosis medication and nutritional support is also important to prevent relapse.

Recently, some modern techniques such as negative pressure treatment and VAC therapy have been introduced to improve wound healing [18-20] and we deem these techniques potentially valuable in the treatment of TACW. However, further clinical studies are required promptly. Collectively, we retrospectively present our experience regarding surgical treatment of TACW in 120 cases and abbreviated the procedures to ‘6C + A’. We deem it effective in decreasing the relapse rate of TACW.

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