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Technical Note & Surgical Technique

Musculo-cutaneous flap for reconstruction surgery for deep surgical site infection after total en bloc spondylectomy: A technical note

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ABSTRACT

Background: Total en bloc spondylectomy (TES) is potential radical resection surgery for spinal tumors. Surgical procedure of TES includes extremely wide detachment of surrounding soft tissue from pathological vertebra, resulting in impairment of blood supply. Moreover, massive dead space inevitably is made after vertebral body resection. Therefore deep surgical site infection (SSI) after TES could be intractable. To date, suitable treatment for deep SSI after TES has not been established.

Case description: A 72 years old man underwent TES of 12th thoracic level via single posterior approach for primary leiomyosarcoma. Postoperative additional irradiation was performed. One year after surgery, late infection around the cage occurred. We removed the cage followed by autologous iliac bone grafting, we treat the wound by open therapy and daily irrigation, followed by negative pressure wound therapy. Four-month later, we performed musculo-cutaneous flap using latissimus dorsi muscle with plastic surgeons. At the follow-up visit one year after flap surgery, no evidence of recurrence of infection was observed.

Conclusion: Musculo-cutaneous flap is one of treatment options to fill the dead space and to control deep SSI after TES.

1. Introduction

Total en bloc spondylectomy (TES) is potential radical resection surgery for spinal tumors including primary and secondary ones [1]. Surgical procedure of TES includes extremely wide detachment of surrounding soft tissue from pathological vertebra, resulting in impairment of blood supply [2]. Moreover, massive dead space inevitably is made after vertebral body resection. Therefore deep surgical site infection (SSI) after TES could be intractable [3]. To date, suitable treatment for deep SSI after TES has not been established.

Here we report a case that was successfully treated by musculocutaneous flap using latissimus dorsi muscle for reconstruction surgery after deep SSI after TES.

2. Case presentation

A 72 years old man complained back pain and referred to our institute in suspicion of spinal tumor at T12 level. On examination, the patient complained back and lateral abdominal pain. Neurological examination revealed no apparent abnormalities except for hypoalgesia around the navel. Plain X-ray revealed lucency at T12 vertebral body. CT scan showed osteolytic lesion at T12 vertebral level (Fig. 1A), which partially includes right pedicle. MRI showed isolow intensity change in T1-weighted image and isointensity change lesion in T2-weighted image at T12 vertebral level (Fig. 1B).

We performed needle biopsy to determine the pathology of the lesion. Pathologist diagnosed the lesion as leiomyosarcoma. Therefore we performed total en bloc spondylectomy of T12 via single posterior approach (Fig. 1 C, D). Postoperative additional irradiation (36 Gy) was performed to prevent tumor recurrence from possible remnants. Postoperative course was uneventful.

One year after surgery, follow-up MRI showed high intensity mass lesion around the cage in T2-weighted image (Fig. 1E) and positron emission tomography-CT scan showed apparently increased uptake at the primary surgical site (Fig. 1F). Therefore we performed revision surgery for possible recurrence of the tumor. During surgery, there was

Abbreviations: CT, (computed tomography); MRI, (magnetic resonance imaging); SSI, (surgical site infection); TES, (total en bloc spondylectomy); T, (thoracic vertebra)

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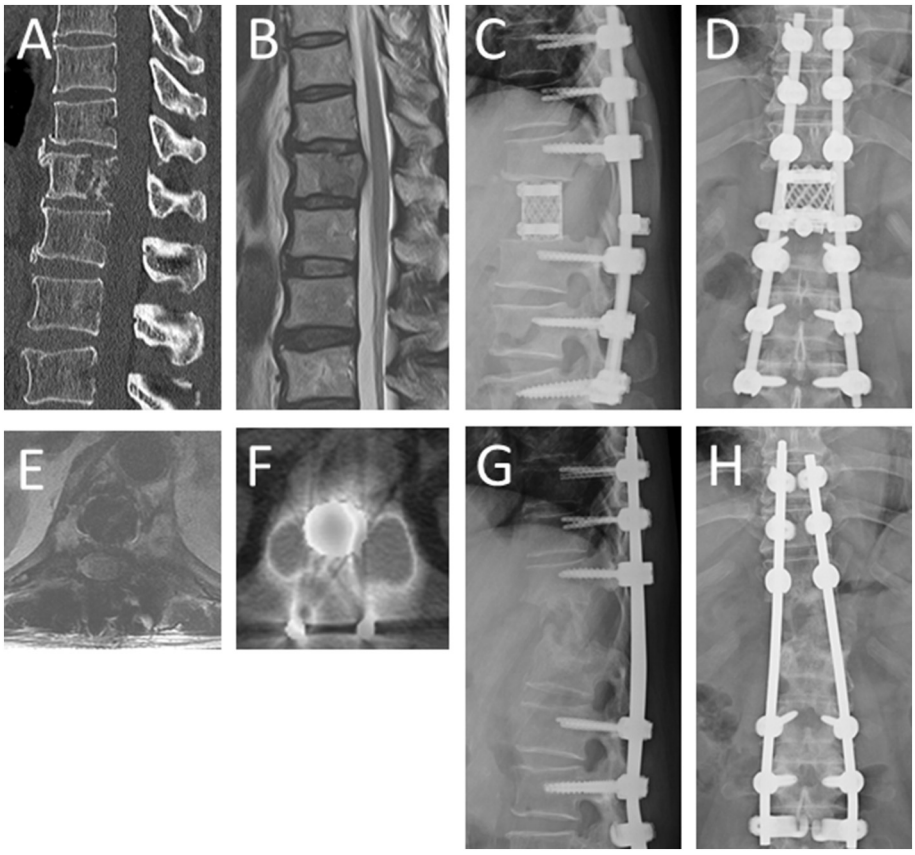

Fig. 1. Pre- and postoperative images. Preoperative multiplanner reconstruction sagittal image of computed tomography revealed osteolytic lesion at 12th thoracic vertebra (A). Magnetic resonance image (MRI) revealed tumor protruding to spinal canal (B). Total en bloc spondylectomy via single posterior approach was performed (C, D). Tumor was gloss totally resected. One year after primary surgery, deep surgical site infection occurred (MRI: E, positron emission tomography: F). Therefore we removed the infected cage followed by autologous iliac bone grafting (G, H).

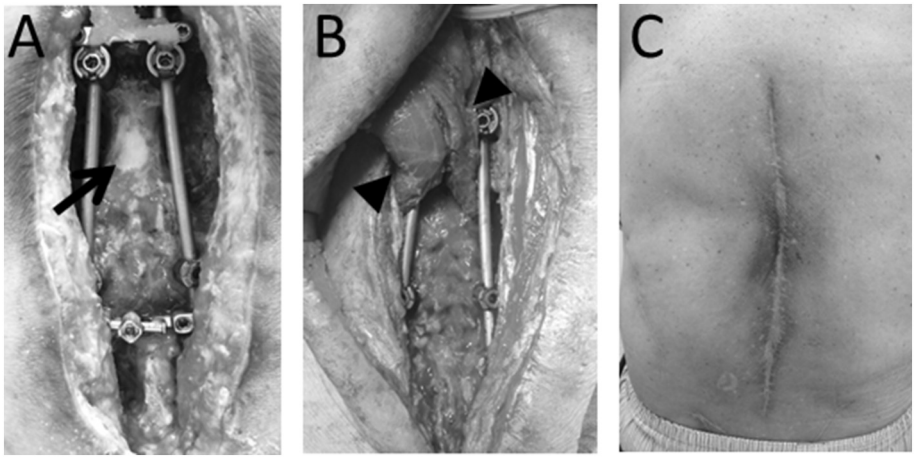

Fig. 2. Photographs of wound.
After open wound therapy and irrigation, granulation formation was observed except for dura mater and exposed implants (A, arrow). Intraoperative photograph of muscle flap using latissimus dorsi muscle filling the massive dead space besides the resected vertebra (B, arrowheads). Appearance of healed wound one year after flap surgery (C).

no apparent tumor mass. Instead of the tumor, pus discharge was observed. Thus we irrigated and curetted around the cage. However, pus discharge continued. Then we removed the cage followed by autologous iliac bone grafting (Fig. 1 G, H). After that, we treat the wound by open therapy and daily irrigation, followed by negative pressure wound therapy (Fig. 2A). Four-month wound treatment resulted in granulation tissue formation around the grafted bone, we performed musculo-cutaneous flap using latissimus dorsi muscle with plastic surgeons (Fig. 2B). Postoperative course was uneventful. At the follow-up visit one year after flap surgery, no evidence of recurrence of infection was observed (Fig. 2C). Follow-up MRI and CT scan also revealed that there was no fluid collection around the instruments and flap, showing no evidence of infection (not shown).

3. Discussion

Surgical procedure of TES includes massive soft tissue detachment and complete abruption of blood vessels attached to the respective vertebra, potentially leading ischemia, for which one of major obstacles to heal infection [3]. Moreover, TES results in production of massive dead space, which is one of inhibitory factors for infection healing. Bulky implants including mesh cage substituting for resected vertebral body and pedicle screws and rods to fix the unstable spinal column after resection is one of the major risk factors for deep surgical site infection. Additionally, radiation therapy is frequently performed as an adjuvant therapy after TES, resulting in more severe soft tissue and bone ischemia, also possibly resulting in late instrumentation failure [4]. All those mechanisms could make deep SSI more intractable.

It is impossible to heal such a large dead space with unsuitable

situation for wound healing described above by conservative therapy alone. Filling of the large dead space by well vascularized tissue is mandatory to control deep SSI after TES [5–8]. Therefore we performed musculocutaneous flap using latissimus dorsi muscle. As a result, the large dead space could be successfully filled and the infection was successfully controlled in the present case.

4. Conclusion

In conclusion, musculo-cutaneous flap is one of treatment options to fill the dead space and to control deep surgical site infection after TES.

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