

## Open Heart Surgery in a Paraplegic Patient

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**We operated on a patient who had been paraplegic since sustaining a spinal cord injury 11 years ago. We made a reversed L-shaped sternum incision and cannulated all tubes for the cardiopulmonary bypass through a wound window. This provided an excellent surgical view without restricting the patient's upper limbs (needed for wheel chair operation), and recovery was good. Just after surgery, however, it was difficult to control blood pressure and the loss of serum albumin. We believe this is the first report of open-heart surgery undertaken in a paraplegic patient and that the reversed L-shaped incision and careful monitoring of hemodynamics each played an important role in the successful outcome. We hope that this report will help in the treatment of other paraplegic patients who need open-heart surgery. (Ann Thorac Cardiovasc Surg 2004; 10: 304-6)**

**Key words:** surgery, spinal cord, cardiopulmonary bypass

### Introduction

Paraplegic patients are dependent on wheel chairs for mobility and self-catheterization for urine collection. That poses a problem for cardiac surgeons because normal techniques can limit arm movement and femoral cannulation can contaminate urinary catheters. We could not find, however, published articles related to the issue to guide us. In this report, the first of open-heart surgery on a paraplegic patient,<sup>1)</sup> we avoided both restriction of the upper limbs and femoral cannulation by applying a reversed L-shaped sternotomy. The outcome was successful, and we hope that this report will help in the treatment of other paraplegic patients who need open-heart surgery.

### Case Report

A 62-year-old paraplegic man visited our hospital complaining of chest oppression. He had fallen 11 years ago

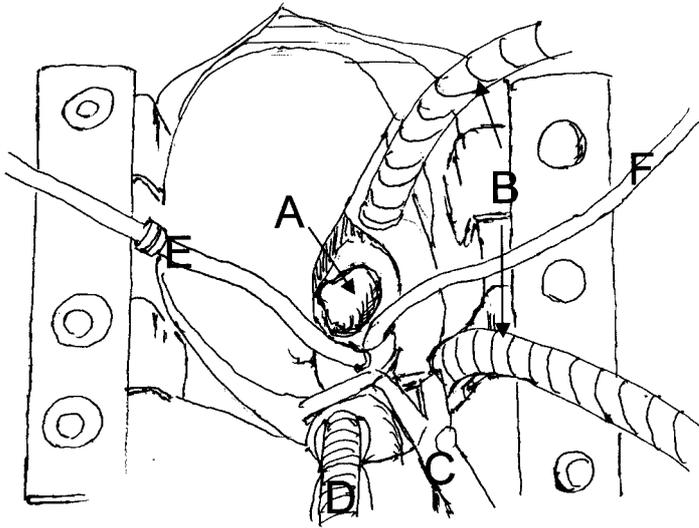
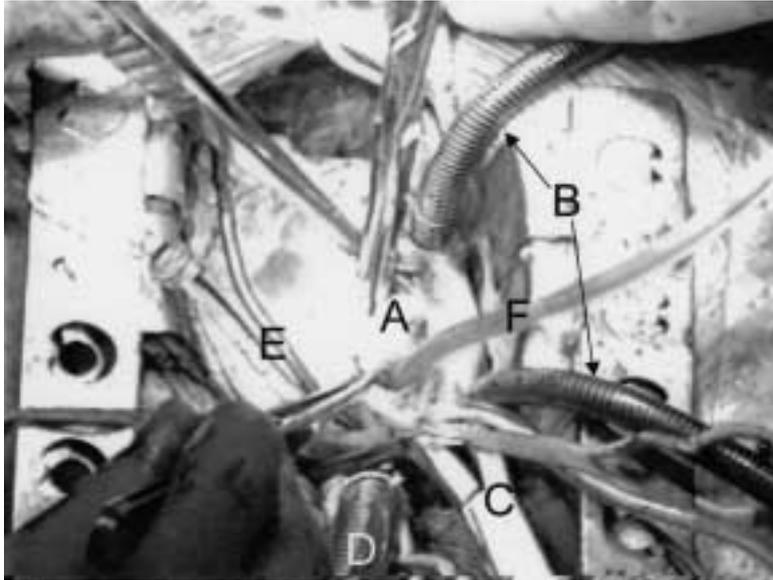
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and had sustained spinal injury at T7. He suffered from neurosis as well and was taking 50 mg of chlorpromazine. Echocardiogram showed a giant left atrial myxoma that frequently obstructed the mitral orifice. A coronary angiogram showed no significant stenotic coronary lesions.

The patient was admitted to the cardiothoracic ward, where he displayed violent behavior toward the staff. He smoked up to the time of surgery in spite of repeated requests not to, and he was unable to sleep. We treated him as a schizophrenic patient.<sup>2)</sup> After surgery, it was necessary for his upper limbs to be unrestrained not only for his mobility but also for his mental condition.<sup>2)</sup>

During the surgery, which we handled as a semi-emergency, we applied a reversed L-shaped sternotomy at the second inter-costal space. We cut the sternum using a craniotome. We clipped the branches of the left inter-costal artery (LITA) down to the 4th inter-costal space while preserving the artery itself. We cannulated the aortic and bi-caval vessels through the mid sternal wound. As shown in Fig. 1, reversed L-shaped sternotomy provided an excellent surgical view. We extirpated the myxoma (4.5×3.0×5.0 cm), in which the stalk was located in the atrial septum. We used cryo-ablation to eliminate any residual tumor in the atrial septum. We closed the sternum with PDS cord (Ethicon) in order to minimize wound pain.



**Fig. 1.** View of tumor provided by reversed L-shaped sternotomy. (A) tumor, (B) venous drainage tube for cardiopulmonary bypass, (C) cross clamp of ascending aorta, (D) aortic tube for arterial perfusion, (E) infusion line for cardioplegic solution, (F) venting tube inserted into left atrium. Upper panel is a photograph taken during surgery; lower panel is a hand-drawn figure clarifying the placement of each instrument.

Post-operative care was in accordance with our previous case report.<sup>2)</sup> We extubated the patient on day 2, and the intensive care unit (ICU) discharged him on day 4 with only a urinary catheter. Although he contracted pneumonia 2 weeks after surgery, he recovered with physical treatment and antibiotics. He was able to operate his wheel chair on day 5 after surgery.

**Discussion**

We believe that this is the first case report of open-heart surgery on a paraplegic patient. We found one report of mitral valve replacement in a quadriplegic patient,<sup>1)</sup> but the quality of life issues differ for paraplegia and quadriplegia. Paraplegic patients can move their upper

limbs and operate a wheel chair, so for prompt recovery from surgery, it is essential to not restrict upper limb exercise. Furthermore, our patient’s psychiatric problems would have prevented him from keeping his upper limbs at rest for 2 months. Our reversed L-shaped sternal incision contributed to his quick physical recovery and stable mental condition after surgery. Preservation of the LITA may have contributed to wound healing, and the vessel will still be available for future coronary surgery, should it be needed, and a tracheostomy will be possible without the concern of sternum infection. Indeed, we anticipated that a tracheostomy might be necessary during this operation because of the patient’s persistent smoking, but fortunately, it was not.

Although we learned a good deal from the report of

open-heart surgery in a quadraplegic patient,<sup>1)</sup> we found it difficult to control blood pressure and protein loss during and after the surgery. Careful monitoring of the blood pressure was necessary during both surgery and the ICU stay. In spite of the satisfactory cardiopulmonary bypass, systolic blood pressure varied between 240 and 40 mmHg in the ICU, especially upon awakening. Total protein and albumin were 3.2 and 1.1 g/dl just after the surgery, respectively. We controlled blood pressure with adrenaline and a calcium channel blocker. Blood and albumin transfusions were also needed for stable hemodynamics.

When the patient returned to the ward, he had only a peripheral infusion line (for antibiotics) and a urinary catheter. As mentioned in our previous report,<sup>2)</sup> a minimum of infusion lines—or better still, none—is ideal for psychiatric patients if accidents are to be prevented. Even after the surgery, this patient was violent toward the nursing staff. A helpful suggestion from a psychiatrist was to

avoid saying “no” when managing a mentally unstable patient.<sup>2)</sup>

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## References

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