

A novel technique for chest drain removal using a two layer method with triclosan-coated sutures

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Abstract: In thoracic surgery, a thoracic drain is always inserted after the surgical procedure. Repair of the wound after removal of the thoracic tube is performed postoperatively, but no universally standard methods currently exists for this tube removal. Here we report a technique using triclosan-coated sutures that is used in thoracic surgery in our hospital. There are several advantages of this technique. First, there is no need for stitches removal on follow-up. Second, it prevents the leakage of pleural exudate because of the tight two-layer sutures. In addition, it was observed to be superior in terms of both wound healing and cosmetic aspects, due to the layer-to-layer sutures. The use of triclosan-coated sutures helps prevent infection and empyema is quite unlikely to occur as the result of the tight ligating of the muscular layer using these sutures. We applied this method in 168 patients over a period of 24 months. There were no complications on removal of the chest tube such as infection, fluid leakage or opening of the surgical wound.

Keywords: New method; thoracic drain; triclosan-coated suture; wound infection

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Introduction

Chest drain insertion is an imperative procedure in thoracic surgical practice (1). The main purposes of chest drainage are to evacuate air or fluid and monitor the condition of the intrathoracic space. In the proper management of chest drainage, securing the chest tube tightly and removing it without any complications are both important. In the conventional method, one suture is used to fix the tube, while another, U-shaped suture is used to close the wound after the removal of the tube. However, using this method, removal of the stitches at follow-ups is required and the resulting scar is usually unsightly. In our institution, we have applied a two-layer method using triclosan-coated sutures. This method has several advantageous features, including no need of stitch removal at follow-up, good wound-healing, and fine, cosmetically pleasing scars without any increase of infection.

Operative techniques

We applied this method in 168 patients for the period of

24 months. The diseases included lung cancer: 112 patients, pneumothorax: 36 patients, and other thoracic diseases: 20 patients. In total, the total number of video-assisted surgeries and open chest surgeries was 158 and 10, respectively. All of the patients provided written informed consent.

The method consists of a two-layer suture in the muscular and epidermal layers with use of 00-gauge triclosan-coated sutures. The suture is applied before the insertion of the tube, according to the following steps.

- (I) A single suture is applied on one side of the muscular layer (*Figure 1A*). This thread is tied and cut;
- (II) A single suture is then applied on the other side. One side of the thread is cut and the other side is allowed to run continuously until the end of the procedure (*Figure 1B*);
- (III) A U-shaped suture is applied to the muscular layer in parallel with the wound (*Figure 1C,D*);
- (IV) Dermostiches are applied from a point near the edge of the epidermis to the other side, in the process making the shape of a figure eight (*Figure 1E-I*).

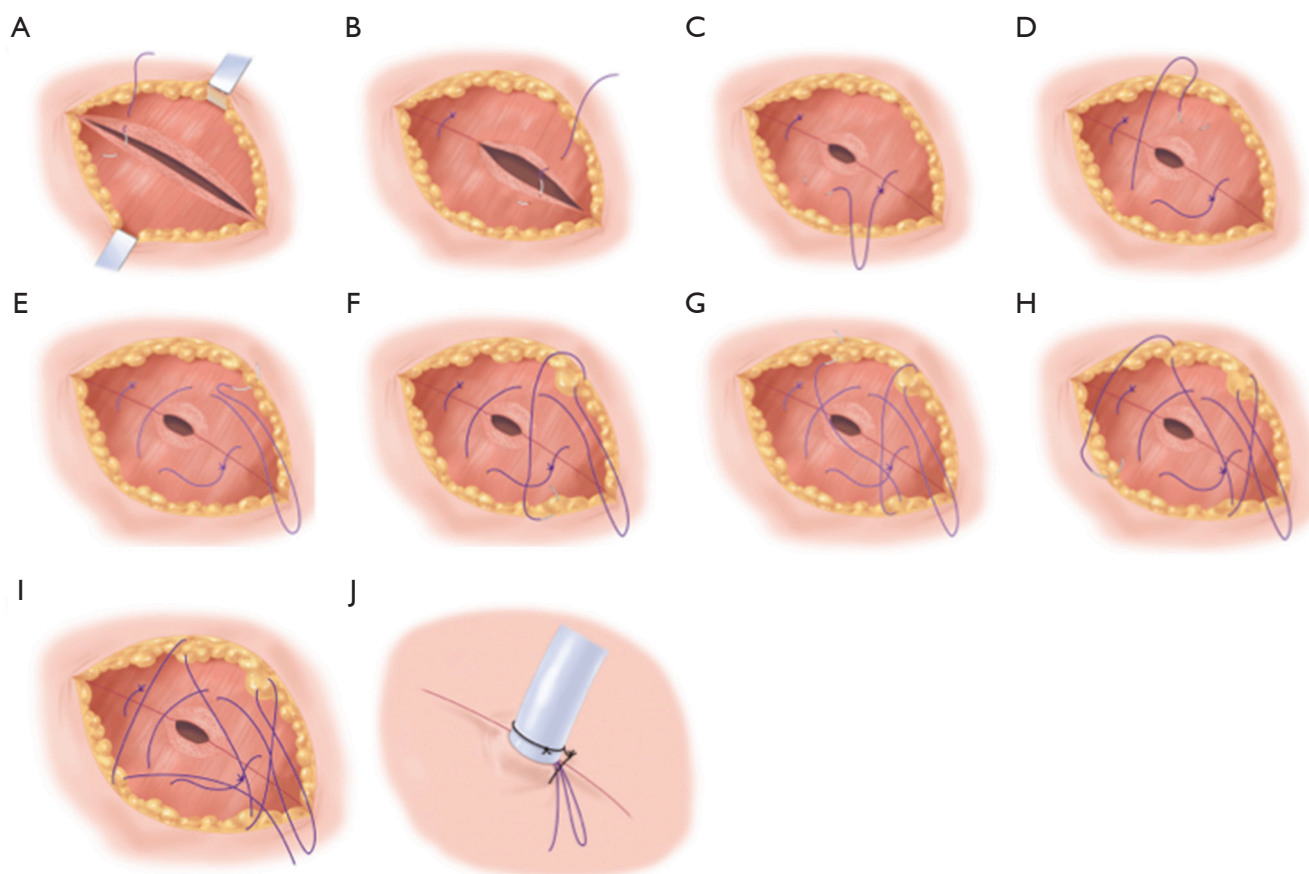


Figure 1 Step-by-step explanatory diagram of suture method. (A) Muscular-layer-suture at one side; (B) the other side of the muscular-layer suture; (C,D) U-shaped suture on muscular layer; (E-H) figure-eight shaped dermostitches; (I) just before the insertion of the chest tube; (J) attachment of the threads to the tube.

Importantly, single stitch is used for the muscular and epidermal sutures (*Figure 1B-I*).

After this procedure, a chest tube (size 20–24 Fr) is inserted. Then, pull the last part of the thread and the thread that run between the dermis and muscle to close the wound (*Figure 1I*). Finally, two threads, one that is straight and the other looped, remain untied and attached to the tube (*Figure 1J*). A nylon-suture is added in order to close the slit beside the drain and fix the tube (*Figure 1J*).

At the time of tube removal, the nylon suture is first cut so that the tube can be removed along with the suture. Immediately after the removal of the tube, the straight and looped triclosan-coated threads are pulled tightly in order to close the muscular layer and prevent the non-sterile part of the thread from going into the wound. Then the threads are tied down. The wound is clear without any visibly evident stitches (*Figure 2*).

Comments

Among the 168 patients, there were no complications relevant to removal of the thoracic tubes such as infection, fluid leakage or wound separation. This method thus displays certain advantages. (I) It ligates the muscular and epidermal layers such that the wound attachment is more rigid than in the case of a single-layer-suture. This promotes wound healing, so certain complications, such as suture separation and fluid leakage, can be reduced in frequency; (II) dermostitches are utilized, so removal of the stitches is not necessary at follow-up and the result is superior in terms of the cosmetic aspect. In addition, our technique is applicable to various types of chest surgeries, including uni- or multi-portal video assisted surgery and open chest surgery.

There is a general concern that the use of dermostitches



Figure 2 Actual photo immediately after the removal of the chest tube.

increases the likelihood of infection because non-sterile threads can get into the wounds. To overcome this concern, we pulled the thread tightly before tying it down in order to make sure to ligate the muscular layer tightly, and to prevent the non-sterile part of the thread from entering the wound. Furthermore, triclosan-coated sutures having antimicrobial activity were employed. This type of suture reportedly reduces the potential for surgical site infection (2). In fact there were no cases of poorly healed wounds or empyema.

There are several reported methods for chest tube removal, such as the “Roman Sandal” method or methods using dressing sheets (3). The Roman Sandal method exhibits a good cosmetic result, but its procedure is rather complicated, requiring two people to perform and the removal of stitches at follow-up. The methods with dressing sheets are reportedly sometimes unreliable and need extra-stitches. The method reported here is reliable, has good

cosmetic results and does not require the removal of stitches at follow-up. It thus constitutes a technical advance in postoperative care for patients undergoing thoracic surgery and has the potential to become the standard procedure in the future. We expect that our method will be validated by the prospective and comparative study to demonstrate its broad clinical utility.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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