

# Use of Small-Bore Silastic Drains in General Thoracic Surgery

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**Study Objective:** To evaluate the safety and efficacy of small-bore, silastic drains for patients undergoing general thoracic surgery.

**Patients and Methods:** Twenty-five patients who received soft, small-bore, silastic drains were compared with 17 patients who received semi-rigid double lumen (DL) tubes retrospectively.

**Results:** The pain score was significantly lower in patients who received the silastic tubes in video-assisted thoracoscopic surgery (VATS) cases on postoperative days 5 and 6, after continuous epidural analgesia had finished ( $P=0.018$ ). No specific morbidity was seen in the patients who received silastic tubes.

**Conclusion:** We considered that soft, small-bore silastic drains were just as effective as traditional DL tubes, but caused less pain especially in VATS cases. (*Ann Thorac Cardiovasc Surg* 2007; 13: 156–158)

**Key words:** small-bore, silastic drain, general thoracic surgery

## Introduction

The drainage and decompression of the thoracic cavity, after general thoracic surgery, has traditionally been accomplished by placing a semi rigid, large-bore, tube [usually 24 to 28 Fr. (1 mm=3 Fr.) in Japan]. Despite a history of relative safety and efficacy, alternatives to the cumbersome and sometimes painful conventional large-bore chest tubes are now being considered. Preliminary reports suggest that soft, small-bore, silastic drains may be superior to the conventional chest tube in patient's tolerability, earlier ambulation and pulmonary toilet.<sup>1,2)</sup> In fact, the safety and efficacy in clinical use of small-bore silastic drains were reported in several operations, such as cardiac surgery, hepatobiliary surgery,<sup>3-5)</sup> and so on. With

the advance of less-invasive surgery, i.e. video-assisted thoracoscopic surgery (VATS), efforts have focused on minimizing postoperative pain and hastening recovery and new techniques in patient management to encourage earlier recovery.

While increasing patient's comfort, soft, small-bore silastic drains may also be less likely to injure adjacent structures in the thoracic cavity or chest wall, especially costal nerves. We sought to investigate the difference in early clinical outcomes of flexible, small-bored silastic drains compared to conventional chest tubes after general thoracic surgery.

## Patients and Methods

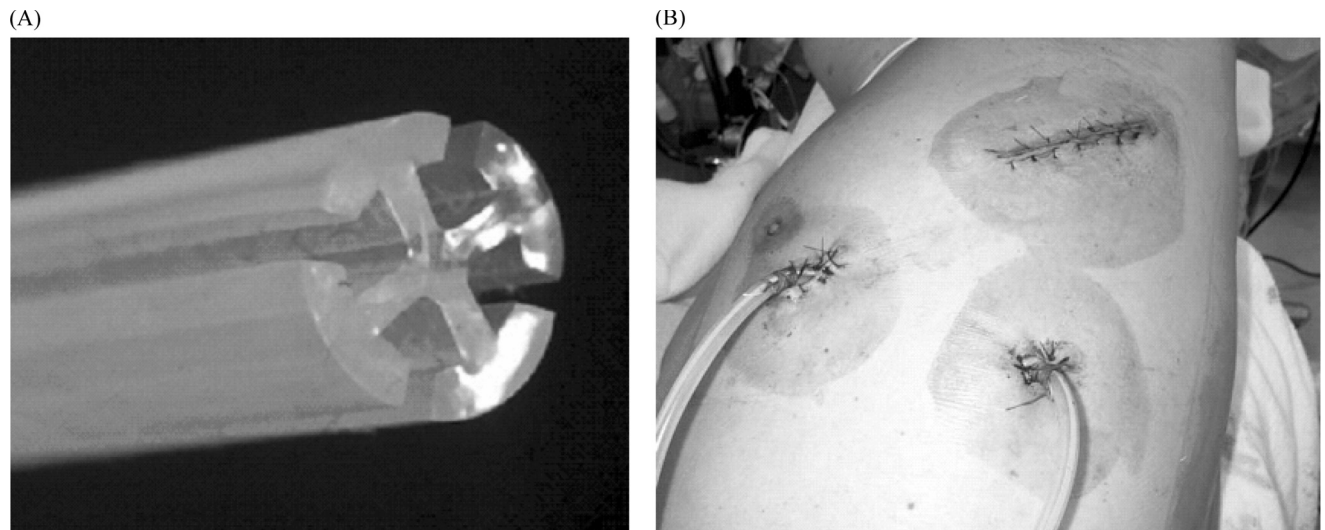
We have used 19 Fr. silastic drains (Fig. 1A, BD: Brake Drain®; Ethicon, Inc., a Johnson & Johnson Company, Somerville, NJ, USA) for thoracic drainage after general thoracic surgery. In BD cases, two 19 Fr. silastic drains were placed through small separate incisions at the completion of surgery (Fig. 1B). One drain was placed around the top of the pleural cavity, and the other was placed on the diaphragm. Drains were attached to the

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**Fig. 1.**

**A:** Cross-section of silastic drain (Blake Drain®, Ethicon, Inc.).

**B:** Usage of the silastic drain with the video-assisted thoracoscopic lobectomy case for lung cancer. Each drain was inserted through separated small wounds used as port during the operation.

suction pump at a pressure of  $-13$  to  $-7$  cmH<sub>2</sub>O using Y-connector (Brake Cardio Connector®, Ethicon Inc., a Johnson & Johnson Company, Somerville, NJ, USA). The drains were removed immediately when the amount of drainage was less than 50 mL for the last 6 hours without air-leakage or bleeding.

Forty-two patients who underwent general thoracic surgery at the Department of Surgery and Science, Kyushu University, between December 2004 and February 2005 were enrolled in this study. The medical records were analyzed retrospectively. Twenty-five patients received two 19 Fr. BD. Seventeen patients received a 24 or 28 Fr. semi-rigid double lumen (DL) tube. Twenty-one patients who underwent VATS were also included 8 segmentectomies, 10 partial resections, and 3 resections of mediastinal tumors. Another 21 cases underwent posterolateral thoracotomy (PT) including 17 segmentectomies, 2 partial resections, 1 carinal resection, and 1 resection of mediastinal tumor. Among VATS cases, 17 received BD, and 8 received BD in PT cases.

The visual scale analog (Face scale) was used to evaluate postoperative pain. Pain was quantified by a 6-point pain score (0 = no pain, 5 = maximal pain) on days 1, 2, 3–4, and 5–6 post-operation.

The pain was controlled using continuous administration of epidural analgesia (lopirocaine, 1 to 2 mL/h) during the chest tube drainage, and NSAIDs were given orally or via a suppository according to the pain.

All comparisons were made using the *t*-test and P values less than 0.05 were considered significant.

## Results

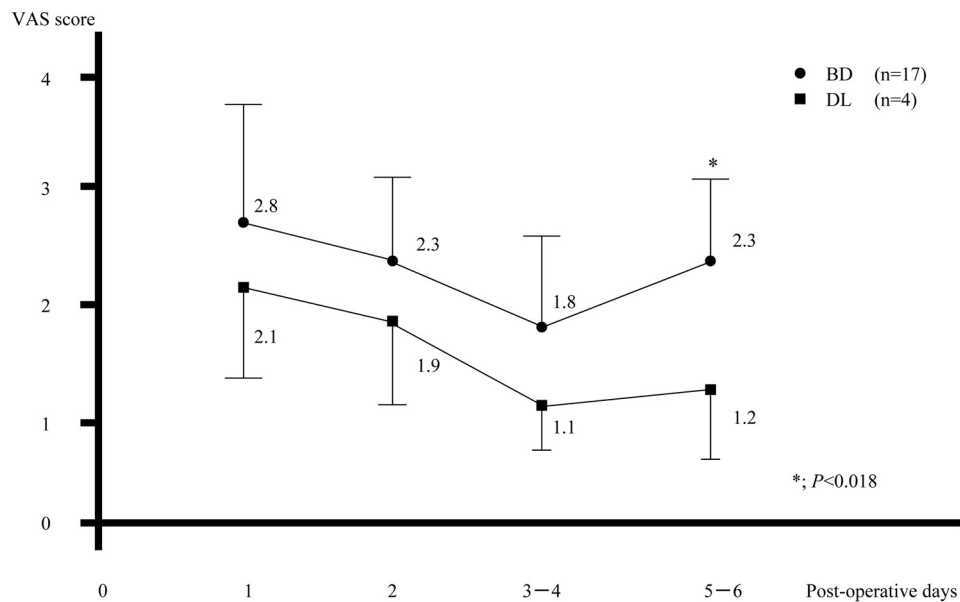
The drainage period for the patients with BD was significantly shorter with  $1.9 \pm 1.4$  days contrary to DL with  $2.9 \pm 1.6$  days ( $P=0.00132$ ). Patterns of lung resection that included segmentectomy, lobectomy and pneumonectomy compared to the partial resection and extirpation of mediastinal tumor did not influence the drainage period. There was no statistical significant differences in the drainage period between those who received BD and DL, both in VATS cases and PT cases. The length of continuous epidural analgesia was  $1.7 \pm 0.8$  days in VATS cases in contrast to  $2.8 \pm 1.3$  days in PT cases ( $P=0.0023$ ).

The pain score was significantly lower in cases received BD compared with DL in VATS cases on day 5 and 6 post-operation, when continuous epidural analgesia had finished ( $P=0.018$ , Fig. 2), although there was no statistical significant difference in the pain score between the patients with BD and DL in PT cases (data not shown).

No postoperative morbidity or mortality was observed in this series of patients.

## Comments

Postoperative drainage of the thoracic cavity is essential



**Fig. 2.** Comparison of postoperative pain score after video-assisted thoracic surgery between the patients who received Brake Drain® (BD) and double lumen tube (DL). The significantly lower pain score was observed on postoperative days 5–6 ( $P=0.018$ ).

after general thoracic surgical operations. The drainage has usually been achieved using semi-rigid, large-bore, even 24 to 28 Fr. tubes that remain 1 or 2, even more than 3 days after general thoracic operation. The soft, small-bore silastic drains are equally effective for draining the thoracic cavity compared with standard large-bore chest tubes as herein reported. In fact, no additional procedure was required due to the insufficiency of drainage. Our results showed that there had been no increased risks associated with the use of soft, small-bore silastic drains.

The pain score is significantly lower in VATS cases compared to the standard thoracotomy cases as previously described.<sup>6,7)</sup> There was no significant difference in the two types of drains in PT cases, however, the pain score was significantly lower in cases with BD treated under VATS. We considered the reason why the significantly lower pain score after day 5 and 6 post-operation was obtained in cases with BD tube treated under VATS may be due to the influence of continuous epidural analgesia, and the lesser pain could be explained by the minimal chest wound of VATS and the soft, small-bore, silastic drains.

In conclusion, soft, small-bore silastic drains are effective as traditional DL tubes and cause less postoperative pain especially in VATS cases. We advocate their use

in patients undergoing VATS.

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