A single 24 F Blake drain after wedge resection or lobectomy: a study on 100 consecutive cases

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Abstract

Objective: To evaluate the results of chest drainage using one 24 F Blake drain after standard thoracic operations (wedge resection and lobectomy). Methods: In 2005, 100 consecutive patients underwent drainage of their pleural cavity following lobectomy or wedge resection(s).

Results: One patient with pleural carcinosis died of pulmonary embolus on day 8. Neither replacement of chest tube nor reoperation was necessary for pleural space problems. Median duration of drainage was 5 days (3—15), 6 days after lobectomy and 4 days after wedge resection. In 15 cases, the duration of drainage was more than 8 days: 11 persistent air leaks and 4 drainages exceeding 150—200 cm³ daily. Ninety percent of patients were discharged the day following the drain removal.

Conclusions: Postoperative courses after standard thoracic procedures using a single 24 F Blake drainage appear similar to that accounting after a classical semi-rigid drainage. Such single drainage may appear now as an acceptable option. The flexible quality of the drain, its reduced caliber, and the character unique of the drainage, may contribute to improve comfort of the operated patients.

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1. Introduction

Drainage of the pleural space after lung resection is usually carried out using two large bore drains (28—32 F). One of these semi-rigid plastic tubes is placed posterior to drain fluid, whereas the other one is positioned at the top of the pleural cavity to drain air leak. Such drainage, by restoring a negative intrapleural pressure, allows a full expansion of the residual lung and a correct ventilation. However, large bore chest double drainage often creates discomfort and many patients experience pain, resulting sometimes in restriction of deep breathing, sputum retention, and atelectasis. Removal of the drains is also for many patients a painful experience, and nowadays many surgeons try to use smaller drains (24—28 F) to reduce the discomfort of patients.

A recent study using Visual Analog Scale evaluation have reported a significant reduction of pain in the postoperative period (at rest, during cough, and at removal), when drainage of the pleural cavity is carried out with two spiral drains rather than two large bore semi-rigid plastic drains [1]. Because such flexible spiral drains exert a constant suction over the fluted portion of their entire length, we undertook a prospective study to evaluate the feasibility and the results of a single flexible drainage after standard thoracic resections, thinking a single drain was sufficient, and focusing our attention on pleural space problems necessitating additional placement of drain or reoperation.

2. Material and methods

Once the thoracic procedure was completed (by the same surgeon, P.I.), with special care to check hemostasis and to close any air leak (using 5-0 or 6-0 nylon sutures), a single flexible 24 F Blake drain (Fig. 1) was inserted through a 0.5 cm skin incision. This radiopaque silicone drain with four longitudinal grooves and a round cross-section was...
manufactured by Ethicon, France. In case of lower lobectomy, it was positioned posterior in the chest cavity, lying in front of the paravertebral recesses. In case of upper lobectomy, it was positioned at the apex inside a little loose ‘lasso’, a loop made with a 5-0 nylon suture. As shown in Fig. 2, it was positioned in that way to form a curve for proper evacuation of air and fluid from the upper and anterior residual cavity. The drain was then secured to the skin, connected to a chest drainage system and put under aspiration at 20 cmH₂O. The drain and the chest drainage system was checked twice a day for tidalizing, bubbling, or fluid level in the waterseal chamber by a surgeon, and checked again by nurses during their rounds. In-hospital chest X-rays were taken a few hours after the operation, systematically on the first and second postoperative days, and then every two or three days in general or more frequently when the patients presented fever, cough, important bubbling. For allowing early ambulation of patients in the unit, aspiration was usually stopped on day 3 or 4, except if there were bubbles or hemorrhage. A chest X-ray was always realized before removal of the drain, the day after (coinciding generally with discharge), with special care to detect any residual pleural effusions or retained blood necessitating addition drainage or reoperation. For some patients awaiting a free place in an other unit or institution, an additional chest X-ray was performed at discharge. The drainage was removed when the daily production was less than 150–200 ml of clear fluid without bubbles at cough, whereas the X-ray showed a full expansion of the residual lung. Because the grooves run all along the length of the tube, the removal of the drain should be quick to avoid the possibility of air entering the pleural cavity (a mesh could be apply on the skin incision during removal whereas the patient stop breathing), and then the purse string suture is gently tied. The great majority of patients (including all who underwent lobectomies or bilobectomies) were checked four or six weeks later discharge with a chest X-ray to assess recurrent pleural effusions or pneumothorax. In a few cases, telephone calls were done to the patients’ physicians to assess any residual pleural space problems.

3. Results

Between April 2005 and November 2005, 100 consecutive patients who underwent a standard thoracic procedure (wedge resection(s) or lobectomy) were drained of their pleural cavity using of a single flexible 24 F Blake. None of the patients was excluded during the time of the study. There were 70 men and 30 women, with a mean age of 55 years (17–83). There were 47 lobectomies (7 right upper, 5 right middle, 12 right lower, 16 left upper, 7 left lower), 3 bilobectomies (2 right upper and middle, 1 right lower and middle), and 2 segmental resections. All these anatomical resections were performed by standard thoracotomy, and mainly for cancer diseases (45 cases). Furthermore, 48 atypical resections by single or multiple wedge(s) were realized, 20 of them by par video-assisted thoracoscopic surgery (VATS). They included 14 various benign diseases, 16 malignant diseases, 8 significant emphysema bullous, and 10 blebs. In this group, the indications of surgery in cases of malignant diseases were generally to perform biopsies and talc pleurodesis.

One patient with pleural carcinosis died of pulmonary embolus on day 8. No blood transfusion was required. Median duration of drainage was 5 days (3–15). It was 6 days after lobectomy and 4 days following wedge resection(s). In 15 cases, the duration of drainage was more than 8 days: 11cases of persistent air leaks that ceased spontaneously and 4 cases of drainage exceeding 150–200 cm³ daily. The great majority of patients (90%) were discharged the day following the chest drain removal, the remaining ones commonly awaited for a free place in a rest house or in a medical unit for continuation of treatment. There were no significant pleural residual effusion or pneumothorax necessitating replacement of chest tube, or reoperation, either during the postoperative courses or at control four to six weeks after discharge.

4. Comment

Our series shows that drainage with a single flexible 24 F Blake is an effective and safe method to drain air and fluid...
following standard thoracic surgery. No patient developed complications related to drain such hemorrhage, occlusion, or sepsis, and there were no pleural effusion or pneumothorax necessitating an additional drainage. Our results confirm the favorable preliminary evaluation in 37 operated patients of drainage by a single flexible drain reported by Kejriwal and Newman [2]. However, in contrast with these authors who reported three cases requiring additional placement of drain for migration after upper lobectomy (among a total of 14 upper lobectomies), no case of such additional drainage was required in our series (including 25 upper lobectomies). This was presumably due to the fact that our Blake drainage was positioned at the apex in case of upper lobectomy, in a curved position for a perfect drainage of the anterior and upper residual cavity, avoiding any displacement. It is noteworthy that despite such curved position of the drain, the drainage was effective, the character flexible of the material avoiding any kinking with obstruction. The technical point of the ‘lasso’, a loop we employed for positioning the drain at the apex in case of upper lobectomy was probably of importance to avoid any displacement of the drain in the postoperative period.

Duration of drainage was quite similar in our series (6 days after lobectomy, 4 days following wedge resection(s)) to the average length of 4.3 days (1—12 days) reported by Kejriwal and Newman [2]. Such durations of drainage are very similar to that currently reported in recent literature: in the randomized study of Terzi et al. [1], 50 patients treated with two flexible drains were compared with 50 others treated two semi-rigid drains: the second drain was removed at 5.9 days when flexible and 6.1 days when semi-rigid. With its non-collapsible tubing and long channels for drainage, the Blake drain has been considered theoretically resistant to occlusion with thrombus [3], exerting a constant suction over 30 cm of its length, with a calculated surface of drainage about three times higher than that of standard tubes (12 cm² vs 4 cm²) [1]. So it is considered as very effective to drain fluid, especially in cardiac surgery [3], even when blood rate reach a level of 300—400 ml/h [4]. It is possible that the excellent property of the drain to evacuate fluid explain a production sometimes exceeding 150—200 cm³ of clear fluid on day 8, as four cases in our series. Some authors have cited active air leak as a contraindication to the use of Blake drain [1]. Although eight cases of emphysema disease with large bubbles were operated on in our series, we did not observed any problems. Furthermore, massive air leak should be a very exceptional situation if any air leak areas are carefully checked at the end of the operation and controlled with various procedures (sutures, seal, strips of Gore-Tex). Anyway, in such very rare situations, the safety should be to let at the end of the operation, two or even three drains, Blake and/or standard, when important air leak is anticipated.

Thus, our prospective study performed on 100 hundred patients confirms the recent first report on this subject [2], and strongly suggest that drainage of standard thoracic operations by one single flexible drain is nowadays a very acceptable option. Ideally, a randomized study should be undertaken to compare the standard option (two semi-rigid plastic drains) versus one single flexible drain, but because pleural space problems are infrequent (as demonstrated in our series), such study would need probably hundred and hundred patients enrolled to make definitive conclusions. Furthermore, concerning evaluation of pain, the difficulties of a randomized study are great because pain is not related only to the drainage but although to the skin incision and thoracotomy, depending also of the individual tolerance for pain and drugs. Whatever the real feasibility in future of such randomized study (the benefit of having one drain rather two is quite obvious), our subjective opinion at present (like that of our nursing staff) is that flexible drainage, improve the comfort of the operated patients, particularly during cough induced by respiratory therapists, and at removal. Several authors have also that subjective impression that two flexible drains improve the comfort of operated on patients [2—4], whereas it was the objective conclusion of a randomized study based on a Visual Analog Scale evaluation [1]. Because the skin incision to place a 24 F Blake drain is unique and smaller than usual, the cosmetic result after removal of the drain is quite obvious, whereas it is noteworthy that the cost of one Blake drain (around 20 euros) is equivalent to that of two classical standard drains.

Finally, our study strongly suggest that one single flexible 24 F Blake is a valuable option of drainage for the great majority of thoracic procedures, including upper lobectomies, where drain should be positioned at the apex to avoid any displacement in the postoperative period. This new option is simpler than the traditional double drainage and probably it helps to improve the comfort of operated patients.

References