Original Research Article

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Can pleural packing be an effective solution for uncontrollable intra or post-operative hemorrhage

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ABSTRACT

Background: Uncontrollable bleeding during thoracic surgery has been a challenging problem faced by surgeons. The aim of this study was to clarify the usefulness of pleural packing as a good alternative to control hemorrhage and to deduce the common point between those patients.

Methods: This was a retrospective case series study of eight patients who underwent thoracic surgery with uncontrollable intrathoracic haemorrhage and shock which required intrathoracic packing from January 2014 to December 2019.

Results: During the study period, eight patients underwent thoracic surgery with uncontrollable intrathoracic haemorrhage and needed packing. Successful hemostasis was achieved in all cases after pleural packing. The mean age was 58.5 years and six patients were males. The common point was the history of pulmonary tuberculosis which was with invasive pulmonary aspergillosis for two patients. Incision was a posterolateral thoracotomy in all cases and six patients required pulmonary resection (five lobectomy and one bilobectomy), one patient required decortication, and one had tumorectomy of a paragonglioma located in the Barety's space. The unpacking took place right after 48 hours. An arrest of the bleeding was noticed in all the remaining patients. The mean time of the mechanical ventilation was 11 days. Complications included atelectasis and infectious pneumonitis. We noted one case of death. Conclusions: Intrathoracic packing may be an effective and feasible technique in managing uncontrollable post-

operative hemorrhage when the life of patients is in danger. This technique should always be considered for patients with tuberculosis history.

Keywords: Hemostasis, Uncontrollable bleeding, Damage control surgery

INTRODUCTION

Uncontrollable bleeding can be a problem after thoracic surgery, either as a result of coagulation derangements or even technical problems. It may be a major cause of per or post-operative mortality. The history of tuberculosis seems to be a contributing factor to this complication.¹

In patients with hemostasis disorders, the administration of fresh frozen plasma, platelets and antifibrinolytic

agents may be insufficient to restore normal haemostatic function. Damage control surgery (DCS) has long been practiced in visceral surgery.^{1,2} The pleural packing has also been used in post-traumatic situations for patients with chest wall bleeding.³

The aim was to study the effect of a pleural packing on hemostasis during an uncontrollable per-operative and postoperative bleeding and to seek the common point between those patients.

METHODS

In this observational study, we retrospectively reviewed eight medical records of patients treated with temporary chest packing for intractable bleeding during a six years period from January 2014 to December 2019 in department of thoracic and cardiovascular surgery of Abderrahen Mami Hospital in Tunisia. The cases in which the patients had a postoperative hemothorax due to a well-defined vessel injury or a serious hemostasis disorder were excluded from our study. All our patients had a diffuse pleural bleeding that was hard to control through the conventional means of hemostasis. The technique consisted of packing over the bleeding points or filling gauze in the bleeding spaces. The success rates of intrathoracic haemostasis, changes in the circulation

and the volume of discharge from the thoracic tubes were evaluated.

Pre-operative variables such as age, sex, comorbidities and presence of tuberculosis history were examined. We also recorded surgical techniques, intraoperative findings and postoperative course. Complication data, return to the operating room, mortality and postoperative length of stay were studied. Pre-operatively, all patients had a tuberculosis history that was the main predisposing factor for bleeding.

RESULTS

This study was about eight patients: six men and two women. The mean age was 58.5 years.

Table 1: Characteristics of patients in our study and different surgical acts.

Patient	Age	Gender	Medical history	Reasons for hospitalization	Surgical approach	Side	Surgical act	Intraoperative exploration
A	50	Male	Treated TB	Hemoptysis	PLT	Left	LUL	Tight pleural adhesions, destroyed lobe
В	53	Male	Aspergill -osis	Hemoptysis	PLT	Right	Bilobecto my of the middle and lower lobes	Incomplete fissure and inflamed pleura
С	44	Female	Treated TB	Aspergillosis with a previous history of tuberculosis	PLT	Left	LUL	Pleural adhesions with diffuse bleeding during lysis of adhesions
D	64	Female	ТВ	Hemoptysis	PLT	Right	Tumorecto my	Tumor mass within the Barety's space infiltrating the superior vena cava and the aortic arch
E	25	Male	Pancytop enia/TB	Purulent pleurisy	PLT	Left	Decortica- tion	Lung tightly adhered to the chest wall with a continuous bleeding during the pneumolysis process
F	56	Male	ТВ	Hemoptysis	PLT	Right	Lobectomy	Lung tightly adhered to the chest wall with a continuous bleeding during the pneumolysis process
G	64	Male	ТВ	Chest pain/hempop-tysis	PLT	Right	Lobectomy	Lung tightly adhered to the chest wall with a continuous bleeding during the pneumolysis process
н	67	Male	TB/asper gillosis	Hemoptysis	PLT	Left	Lobectomy (extra- pleural)	Lung tightly adhered to the chest wall with a continuous bleeding during the pneumolysis process

TB: tuberculosis; PLT: posterolateral thoracotomy; LUL: left upper lobectomy.

The common feature in these eight cases was the history of pulmonary tuberculosis which was treated previously, in whom two patients was followed up for an invasive pulmonary aspergillosis and one patient had undergone an antiplatelet therapy for a stable angina. One patient had pancytopenia of an undefined origin.

The reasons for hospitalization were a mean abundance hemoptysis with the background of an excavated lesion unresponsive to the embolization in six patients, an aspegilloma with a previous history of tuberculosis in one patient and a purulent pleural effusion in one patient. The approach was a posterolateral thoracotomy in the fifth intercostal space: four on the left and four on the right. Three patients underwent a lobectomy of the left upper lobe, two patients underwent a lobectomy of the right upper lobe and one patient underwent a bilobectomy of both the lower and middle lobes. A decortication was done for one patient and a tumorectomy of a paragonglioma located in the Barety's space for one patient (Table 1). The decision of the pleural packing was made intraoperatively due to an uncontrollable continuous pleural bleeding in six patients. The other two patients had a postoperative hemothorax with a drainage flow over 400 ml of blood per hour during the first 24 hours after surgery.

A revision surgery was indicated in all cases. We found intraoperatively a diffuse continuous bleeding in one patient and a topical bleeding in intimate contact with large mediastinal blood vessels in the other patient. Haemostasis was achieved successfully in seven cases. We deplored the death of one patient during the intervention due to a hemorrhagic shock despite the blood transfusion and the resuscitation measures. unpacking took place right after 48 hours. An arrest of the bleeding was noticed in all the remaining patients. The mean time of the mechanical ventilation was 11 days. One patient had developed a persistent pulmonary atelectasis with an infectious pneumonitis than died afterwards due to a septic shock despite the antibiotic treatment and the administration of catecholamines at high therapeutic doses.

DISCUSSION

Damage control surgery (DCS) has long been practiced in visceral surgery mostly following hepatic traumas with intra-peritoneal bleeding whether or not combined with other extra-abdominal injuries. ¹⁻³ DCS is set for patients in a serious condition who requires an urgent surgery but for whom extending the duration of the surgery would increase the severity of the physiological disturbance and metabolic alteration. ^{2,4-6} DCS is in fact a part of a sequential care combining an as brief as possible preoperative resuscitation with surgery limited to controlling the damages (stopping a bleeding, limiting contaminations) without a definitive repair. The latter will be done later on during a scheduled reintervention following a phase of a resuscitation targeting the fix of

the physiological disturbances caused by the traumas and its treatment. ^{2,6}

The pleural packing has been also used in post-traumatic situations for patients with chest wall bleeding with good outcomes despite the fact that most thoracic surgeons avoid it because of its harmful effects on cardiorespiratory function.⁶

We describe in this study, for the first time, our experience with pleural packing following an uncontrollable intraoperative and postoperative bleeding. This technique consists of covering the bleeding wounds (in parietal or visceral pleura) with sterile drapes (about 3 or 4 of them) in order to stop the topical bleeding, nevertheless without putting any pressure on the cardiorespiratory system (Figure 1). One essential requirement must be checked before performing a pleural packing: it's a satisfying re-expansion of the lung parenchyma because the lack of re-expansion promotes postoperative atelectasis and then infectious complications, eventually postoperative pneumonia.^{7,8}



Figure 1: Covering the bleeding wounds with sterile drapes.

The unpacking, which consists of removing the sterile drapes, takes place 24 hours after the pleural packing (Figure 2). The check of the hemostasis is crucial and a second packing may be performed if a topical bleeding persists.



Figure 2: Unpacking, removing the sterile drapes.

Mortality is mainly due either to the initial surgeries which were a lung resection, a tumorectomy or a decortication in our study or to the complications related to prolonged intubation. A major fact, that we noted that the common feature in the eight cases is tuberculosis history.

Indeed, tuberculosis surgery, which has no place anymore, except for diagnostic purposes as a last resort, is burdened with important and sometimes serious complications and it needs preoperative preparations.

The post-operative bleeding encountered in these patients can be explained by chronic inflammatory phenomena and adhesions due to tuberculosis often poorly treated by bad patient compliance or reoccurrences neglected by patients. That's why, any patient with a history of tuberculosis should be considered to be with high risk of bleeding.⁹

CONCLUSION

This pleural packing technique is simple, feasible and highly effective in managing uncontrollable post-operative hemorrhages when the life of patients is in danger. It tampons further bleeding and allows the optimization of hemostasis by limiting the excessive transfusion of blood products. Tuberculosis remains an endemic disease in our country and seems to be the major factor that increases per-operative bleeding risks.

We think that thoracic surgeons should systematically be prepared to these complications when operating patients with tuberculosis history and packing may be the adequate and even the only solution.

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Institutional Ethics Committee

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