Haemoptysis: Endoscopic options

Prof. Dr. Arschang Valipour
Ludwig-Boltzmann-Institute for COPD and Respiratory Epidemiology
Department of Respiratory and Critical Care Medicine
Otto Wagner Hospital
Sanatoriumstr. 2
1140 Vienna
AUSTRIA
arschang.valipour@wienkav.at

AIMS

- Understanding the underlying causes of haemoptysis
- Understanding the different techniques available to manage haemoptysis with a focus on interventional pulmonology

SUMMARY

Severe hemoptysis is a life-threatening condition. The presentation delivered at the PG course will familiarize the auditorium with the underlying causes and definitions of haemoptysis. Therapeutic strategies such as bronchoscopy, interventional angiography, and/or surgery may need to be applied in the clinical setting depending on institutional resources, personal experience, and patients’ condition.

Acute massive hemoptysis is a life-threatening condition associated with a high mortality rate ranging from 23 – 85% (1). The most frequent causes of life threatening haemoptysis are displayed in Table 1. The main threat in the acute phase remains asphyxiation resulting from flooding of the airways and alveoli with blood. Maintenance of airway patency and control of bleeding are therefore the primary goals, followed by identifying the site and the underlying cause of bleeding. Correctly inserted double-lumen endotracheal tubes may achieve some of these goals through isolation of the affected and adequate ventilation of the non-affected lung. However, these tubes carry significant risks (2,3) and are difficult to place properly (4). In fact, the majority of chest physicians admit a lack of proficiency with placement of the double-lumen tubes (5). Another disadvantage is that they are easily obstructed by clots and do not permit passage of bronchoscopes of adequate size to allow toilet under unobstructed vision (6). Hemoptysis control can also be obtained by using either local iced saline injections (7) or regional instillation of vasoconstrictive agents (8,9) via bronchoscopy. While this approach might be useful in mild to moderate hemoptysis, it is insufficient for massive active bleeding where the agent is diluted and flushed away (1).

Other endoscopic techniques are topical haemostatic tamponade therapy using oxidized regenerated cellulose (ORC), injections of fibrin-thrombin solutions, tranexamic acid, or (sub) segmental balloon occlusion to stop the bleeding. Haemostasis with ORC is primarily due to selective tamponade of a bleeding bronchus (10). A tight blockade is essential for the success of treatment and may require up to 10 layers of the mesh, which can be customized to suit the needs required. After saturation with blood, thrombus formation occurs due to the physical properties of the mesh, rather than producing any alteration of the physiologic clotting mechanism. Oxidized cellulose has caustic activities and reacts with blood to precipitate an artificial coagulum that provides the substrate for further clotting (11).

Alternatively, spillage of blood to non-affected functionally intact alveolar areas of the lung can be prevented by placing a balloon catheter into the bleeding airway (12). Removal of the bronchoscope over the balloon, however, may be difficult and require different products than those typically used in endoscopy. Should the bleeding resume despite bronchoscopic interventions, other therapeutic options
such as interventional angiography and/or surgery should be considered. With BAE initial control of bleeding can be achieved in 60 to 95%. (13,14). A surgical approach in the management of hemoptysis may be needed for a specific large-vessel bleed, or if there is a parenchymal source that is resectable. Surgery is, however, associated with a relatively high risk of morbidity and mortality during the acute episode (3,15).

### Table 1. Most frequent causes for life threatening haemoptysis
(modified from Sakr L, Dutau H. Respiration 2010)

<table>
<thead>
<tr>
<th>Cause</th>
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<tbody>
<tr>
<td>Lung cancer, Carcinoid, Lung metastasis</td>
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<tr>
<td>Pulmonary tuberculosis</td>
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<tr>
<td>Bronchiectasis</td>
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<tr>
<td>Aspergilloma</td>
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<td>Pneumonia</td>
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</table>
| Systemic autoimmune disease with pulmonary hemorrhage (Granulomatosis, Goodpasture Syndrome,…)
| Chronic Bronchitis                                                   |
| Iatrogenic (post lung-biopsy, post RFA of lung lesions, post CT-guided biopsy of lung lesions,…)

### REFERENCES


RECOMMENDED READING