The use of OKCEL® S (oxidized cellulose-based haemostat) in clinical practice – CONTROLLED HAEMOSTASIS IN THORACIC SURGERY

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The author points out the possibility of improving surgical results by reducing perioperative and postoperative bleeding in thoracic surgery thanks to the use of the local haemostat OKCEL®. In the surgical treatment of post-inflammatory complications in the pleural cavity, we are exposed to a difficult control of non-surgical type of bleeding from multiple post-inflammatory adhesions. By using oxidized cellulose-based haemostats, blood losses are minimized. Another advantage is their biological friendliness because it is an absorbable material. During its degradation, the pH decreases and the resulting acidic environment has a bacteriostatic effect on the entire spectrum of potential microbes.

Case report

In this case report, we demonstrate the procedure of surgical treatment of post-inflammatory involvement of the pleural space after bronchopneumonia, which was complicated by the development of an empyema - inflammation in the pleural cavity.

A 64-year-old man suffered from a febrile illness and subsequent pneumonia. It is likely that a reactive effusion first occurred in the pleural cavity as a result of pleural irritation. The infection (transfer of bacteria from the affected lung parenchyma) developed empyema, which was not properly treated by chest drainage and this led to fibrothorax and the complete absence of lung parenchyma airiness. The only solution was surgical treatment - decortication and pleurectomy, i.e. removal of both leaves of the affected pleura and release of lung tissue from the adhesions. We started the operation about 6 weeks after the first clinical signs of inflammatory symptoms, such as fever, pleural pain and dry, later productive, cough with expectoration of the mucus. We performed a classic lateral thoracotomy in the 4th intercostal space, the pleural spaces were obliterated. After partial release of the lung from the adhesions to the mediastinum and to the diaphragm, we first removed the parietal highly reinforced pleura and then performed decortication - removal of the visceral pleura. The lung expanded well, although initially lamellar airlessness was still evident. Higher inspiratory pressures restored airiness.

The perioperative complication was, on the one hand, air leakage from the injured lung surface after removal of the fibrous alveoli, and, on the other hand, diffuse bleeding. Initially, we controlled the bleeding by electrocoagulation, stitching, and later by using a haemostatic material based on oxidized cellulose Okcel® S. We enhanced the haemostatic effect by applying a warm gauze roll and targeted pressure on the bleeding sites. After about 8 minutes, after removal of the gauze roll, the material adhered firmly to the originally bleeding lung tissue with a significant decrease in air leakage from the lung tissue. After 10 minutes, the haemostatic material was removed and blood clots formed on the surface of the originally bleeding lung tissue.

After a careful check of other potentially bleeding sites, a thoracic drain was inserted and the wound was closed with a newly inserted haemostat. In the postoperative period, air leakage persisted for another 48 hours, but during X-ray examinations the lung parenchyma was dilated. The total waste through the chest drain from its' introduction, i.e. for 72 hours, was 950 ml. The patient was rehabilitated and released for home treatment on the tenth postoperative day.

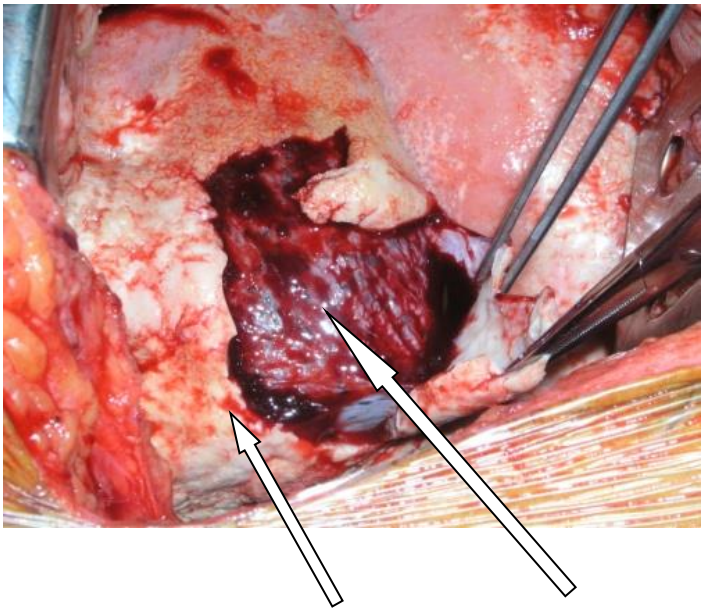
Discussion

Local haemostats are preferably used in the surgical treatment of the final phase of an inflammatory disease of the pleural space, when fibrothorax develops for various reasons. During the operation, we do not avoid creating a large surgical wound after removing the thickened and often calcified pleural leaves not only on the actual surface of the lung parenchyma, but also on the inner surface of the chest wall. Local control of bleeding can be performed by several techniques, either by electrocoagulation of newly formed vascular plexus, or by ligation or their stitching. However, after removal of the visceral pleura, i.e. the cover of the lung parenchyma, effective haemostasis is difficult by the above-mentioned techniques, therefore it is advantageous to use haemostats based on oxidized cellulose, which we routinely do. Two techniques can be used in this case - on the one hand, the material can be removed after placing it on the bleeding site and achieving haemostasis, when there is a risk that bleeding from the newly formed blood cake will resume. On the other hand, the material can be left in place which is our preferred technique.

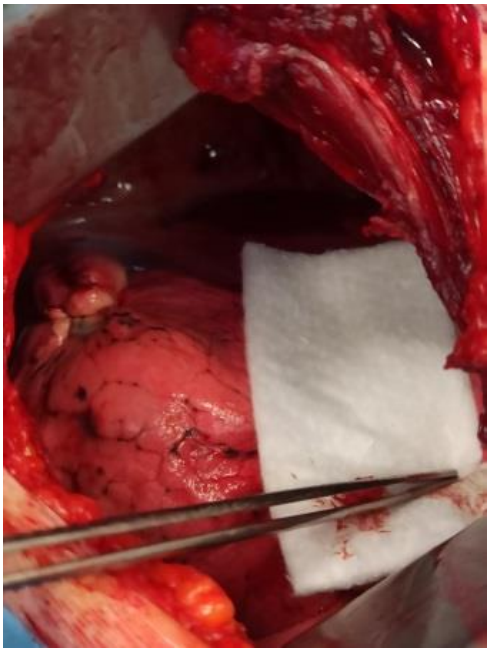
Conclusion

The advantages of oxidized cellulose-based haemostats and leaving them in situ on the bleeding site lie in their haemostatic ability, as bleeding stops within 2 to 6 minutes. This time is influenced by the specific situation when applying the haemostatic agent, and in the above case the rate of haemostasis was influenced by the escaping air from the injured lung surface. Another advantage of using oxidized cellulose haemostats is the fact that the pH decreases during the biodegradation of cellulose. This creates an antibacterial environment against a wide range of gram-positive and gram-negative bacteria. The ability to accelerate biochemical processes is also advantageous as this significantly supports the healing process. The properties of oxidized cellulose-based haemostats exceed the properties of other haemostats used in the past at an economically incomparable level.

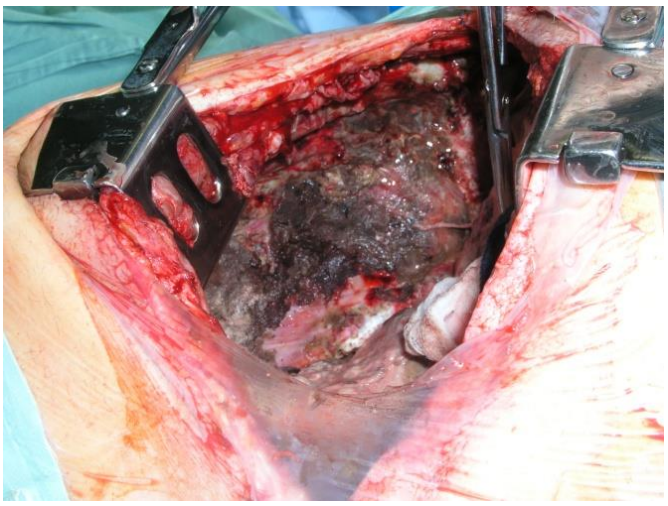
Photo documentation:



Picture 1: Partial removal of the reinforced pleura and bleeding lung tissue



Picture 2: Use of local haemostat Okcel® S



Picture 3: Newly formed blood cake after removing the haemostat

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