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Treatment of Lung Abscess – from Hippocrates to Present

Leczenie ropnia płuca – od Hipokratesa do dnia obecnego

Abstract

Background. Lung abscess has been treated traditionally by incision and drainage. This approach has changed since the discovery of antibiotics, when conservative management has replaced surgical drainage. Only patients resistant to non-operative treatment were referred to surgery. These were usually treated by lobectomy. Prompted by management of some critical patients who could not tolerate lobectomy, the author re-introduced drainage of lung abscess.

Material and Methods. The drainage is usually done by percutaneous penetration of the abscess and insertion of a tube drain, and rarely by a minithoracotomy and pulmonotomy.

Results. Of 29 patients who did not respond to medical therapy and were treated by drainage, this treatment resulted in complete resolution of abscess in 24 patients, partial resolution and replacement by fibrosis in 2, and 3 failures.

Conclusions. Drainage of lung abscess is a safe procedure indicated in patients in whom short-term medical therapy has failed. It is curative, carries a minimal risk, and avoids loss of functioning lung parenchyma. The complication rate is low. Resection should be reserved for the rare instances of massive necrosis (pulmonary gangrene) and for severe life-threatening hemorrhage (Adv Clin Exp Med 2010, 19, 5, 551–554).

Key words: lung abscess, drainage, surgery for lung abscess.

Streszczenie

Wprowadzenie. Ropień płucia był leczony konwencjonalnie przez nacięcie i sączkowanie. Podejście to zmieniło się od czasu wprowadzenia antybiotyków, gdy leczenie zachowawcze zastąpiło sączkowanie chirurgiczne. Tylko chorzy oporni na leczenie zachowawcze byli kierowani na chirurgię. Wycinańo u nich zwykle płat płucia. Skloniony doświadczaniem z kilkoma chorąży, których stan krytyczny nie pozwalał na wycięcie płata, autor wprowadził od nowa sączkowanie ropnia.

Materiał i metody. Sączkowanie wykonuje się zwykle przez przezskórne wprost czkowanie sączka do jamy ropnia, a czasem za pomocą ministerakotomii i nacięcia tkanki płucnej.

 Wyniki. 29 chorych, którzy nie zareagowali właściwie na leczenie zachowawcze, byli leczeni za pomocą sączkowania. Postępowanie to doprowadziło do całkowitego wchłonięcia ropnia u 24 chorych, częściowe wchłonięcie i zablokowanie nastąpiło u 2 chorych oraz wystąpiły 3 niepowodzenia.


Słowa kluczowe: ropień płucia, sączkowanie, operacja ropnia.

Lung abscess is defined as collection of pus and necrotic debris contained in a cavity formed by local disintegration of lung parenchyma. A large lung abscess involving at least one entire lobe is referred to as pulmonary gangrene. According to this definition, both abscess and gangrene are the result of the same pathologic process; they differ only in extent [1]. Lung abscess can be either acute
Historical Note

The history of lung abscess dates back to the times of Hippocrates, who drained abscesses through incision in the chest wall. Except for technical modifications, this treatment has not changed until the middle of the 19th century. In 1855 Mosler was the first to disinfect a tuberculous cavity. His attempts were followed by several investigators who treated tuberculous cavities and pyogenic abscesses by drainage and antiseptic agents, and usually reported on isolated instances, with variable results. In 1885 Truc reported on a series of 19 patients with pyogenic lung abscesses treated by incision, drainage and injection of antiseptic solutions. Six patients were cured, five improved, and eight (42%) have died [3]. Conservative treatment of lung abscess did not exist at the time. This state of affairs was summarized by William Osler in his textbook The Principles and Practice of Medicine. It stated that Medicinal treatment is of little avail in the abscess of the lung. When well defined and superficial, an attempt should always be made to open and drain it [4].

Drainage was usually carried out in two stages. In the first stage adhesions were created between the visceral and the parietal pleura, using a variety of irritating substances. This was intended to prevent spillage of pus into the pleural cavity at the time of drainage. The second stage – incision and drainage – was carried out several weeks later, when the adhesions were presumed to have formed. In order to prevent premature closure of the drainage site, some surgeons placed a short tube in the abscess cavity, others sutured the margins of the pulmonary window to the skin.

An important contribution was made by Neuhof and Touroff of New York in 1936. Assuming correctly that lung abscess is nearly always situated superficially, close to the visceral pleura and accompanied by local pleuritis, they abandoned the two-stage method, and carried out a one-stage operation with marked success. Their experience included 250 patients with putrid lung abscess. They resected a 5-cm segment of rib overlying the abscess, used gauze packs to control bleeding, and after aspirating pus with a needle, unroofed the abscess, cleaned the cavity, and packed it with iodoform gauze [5]. Their one-stage method caused initially much controversy, but it culminated in a remarkable success, with a mortality rate of only 4%. However, there were complications, such as residual bronchiectasis and an occasional empyema. This prompted Shaw and Paulson to introduce the method of lobectomy when initial trials at drainage did not succeed. Their report summarized 86 patients with putrid lung abscess treated between 1944 and 1947. Fifty-two of these patients were eventually treated by resection, with two deaths, or 3.8% [6]. They recognized the role of antibiotics in lowering the mortality rate.

In the 1950s the use of antibiotics came into common use. Many patients with putrid lung abscess were improved or cured without surgical methods and, gradually lung abscess became converted from a surgical to a medical disease [7]. By the 1960s, '70s and '80s the mainstay of therapy of lung abscess was antibiotics and physical therapy, including postural drainage and bronchoscopy, with external drainage playing a steadily diminishing role. Only those patients who did not benefit of medical therapy, the “medical failures”, were referred to surgeons. These were usually the far advanced, most difficult cases, and they were treated by resection, usually a lobectomy. Surgical drainage of lung abscess became nearly forgotten. In 1974 Chidi and Mendelsohn reported on 90 patients using conservative methods (antibiotics and postural drainage) and obtained good results in 71 instances, or 79% [8]. Estrella and colleagues obtained good results in 89 of 107 patients, or 83% [9]. In our own series of 151 patients treated conservatively between 1972 and 1996, 113 patients (75%) were cured of abscess.

Personal Experience

In 1980 a 47-year-old man with an abscess in the right upper lobe was referred to our service. He coughed and expectorated large amounts of purulent sputum and blood. Bacteriologic studies showed a mixture of microorganisms with predominance of Pseudomonas. Bronchoscopy disclosed pus mixed with blood exuding from the bronchus of the right upper lobe, however, effective bronchoscopic drainage could not be achieved. Despite treatment with gentamycin, cephalothin, carbenicillin and amikacin, the patient’s condition deteriorated. He was emaciated and septic, with fever of 41°C, and body weight of 38 kg, while his height was 170 cm. His hemoptysis progressed into massive bleeding, and the hemoglobin level dropped from 15 gm to 9.8 gm per 100 ml in one day despite blood transfusions. Roentgenograms showed the abscess cavity filled with blood. It was an obvious case of medical failure, and lobectomy was recommended. However, the patient’s instability at thoracotomy prompted us to abandon the (duration of less than six weeks) or chronic. This distinction is important because it mandates different therapeutic approaches [2].
plan and, instead, the abscess was drained through a pulmonotomy. During the next 24 hours the bleeding ceased and his condition stabilized. On the fifth day oral feedings were started and the I.V. was discontinued. The pleural drain was removed on the ninth day, and the tube draining the abscess, on the 24th day, after all drainage stopped. Five weeks after the operation, roentgenograms showed complete replacement of the abscess cavity by scar. After three months the patient was well and asymptomatic, his weight 57 kg, and he returned to his work.

Similar experience with six other patients prompted us to treat medically failed lung abscesses by drainage rather than resection, which on our service became routine as of 1980. The author reported on that early experience at the Centenary Congress of the Polish Surgical Association in Kraków on 1989. Our total experience was reported in the Polish Journal of Surgery in 2003 [10]. According to it, between 1980 and 2001, of 145 patients with lung abscess, good results were achieved by non-surgical methods in 116 patients, or 80%. In the remaining 29 patients the conservative measures did not suffice, and they were treated by drainage, with complete resolution of the abscess in 24 patients, partial resolution and replacement by fibrosis in two, and three failures: one patient died; in one, a lobectomy was eventually done; and one patient refused further treatment. There were three non-fatal complications [10].

Discussion

In view of these results, one must ponder the question, whether the therapeutic approach to lung abscess should be different from the approach to abscesses in other locations. The ancient principle of ubi pus ibi evacua seems as valid today as in the past. Yet, Takaro and associates expressed an extremely conservative view, suggesting antibiotic regimen “until cavitation disappeared and clinical ‘cure’ is attained. This may require 3 to 20 weeks, but with this treatment surgery for primary lung abscess was not required over a 4½ year period” [11]. I doubt whether this is the best way of handling the lung abscess. The advantages of antimicrobial therapy over indiscriminate surgery are not questioned, but it is difficult to understand why administration of antibiotics over a 20-week period should be preferable to simple surgical drainage. The drawbacks of excessive use of antibiotics are too obvious to need an explanation, and if surgical drainage can help, it should not be delayed for too long. The condition of some patients with lung abscesses will deteriorate under most aggressive antibiotic regimen. Accordingly, operative intervention in the management of lung abscess should not be postponed indefinitely [12].

In choosing the method of operative treatment, one must remember that lobectomy imposes on the patient much greater trauma than tube drainage, and there is an obvious disadvantage in resecting functional lung parenchyma. In addition, general anesthesia is required, which is not usually necessary for a drainage procedure. Of course, the approach to operative treatment of lung abscess depends in large measure on its pathogenetic stage. In particular, early treatment is emphasized, since healing by resolution can take place only if drainage is instituted during the acute stage, when obliteration of the cavity can occur. Once a chronic abscess has developed, the thick wall may prevent collapse of the cavity, making drainage ineffective [2]. Under such circumstances resection may still be necessary. However, this can be avoided, if drainage is instituted during the acute stage. Other indications for resection are rare, and include pulmonary gangrene involving at least one entire lobe, and massive bleeding that endangers life.

The author concludes that drainage of lung abscess is a safe procedure indicated in patients in whom short-term medical therapy has failed. It is curative, carries a minimal risk, and avoids loss of functioning lung parenchyma. The complication rate is low. Resection should be reserved for the rare instances of massive necrosis (pulmonary gangrene) and for severe life-threatening hemorrhage.

References


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