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Residual Cavity after Pulmonary Exerse: Factors of Survival, Therapeutic and Evolutive Modalities

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Abstract **Original Research Article**

The residual pocket after lobectomy is a frequent complication that can lead to the completion of a thoracoplasty. Several strategies and methods are proposed in the management of this complication to reduce the morbidity in the postoperative course. The purpose of our study is to analyze the factors of occurrence, as well as the therapeutic and evolutionary modalities of the residual pockets after lobectomy. ***Method***: A single-center retrospective analytical study of patients with a residual pocket after radiographic lobectomy during the period of January 1, 2000 to December 31, 2014. ***Result***: During the study period 17 patients presented a residual apical pocket after pulmonary resection in 123 patients followed for lobectomy. All these patients were male with a mean age of 37 years. The majority of patients had a history of pulmonary tuberculosis 16/17 cases. Surgery of pulmonary aspergilloma was strongly presumptive to the occurrence of a residual pocket after lobectomy. The correlation is statistically significant; as well as superior lobectomy isolated or associated with Fowler segmentectomy and non-selective orotracheal intubation. After an average of 49 months with a minimum of 6 months and a maximum of 168 months. The evolution of the pockets was marked by erasure healing or retraction of the pocket in 10 patients, of whom 3 had developed pachypleuritis. Persistence of the pocket without modification was noted in 5 cases; we observed superinfection of the apical pocket in two patients. One had benefited from a thoracoplasty and the other had evolved well under treatment combining a daily irrigation washing of the pleural cavity and antibiotic therapy

Keywords: lobectomy; tuberculosis, complications.

INTRODUCTION

The residual cavities are persistent or residual aerial effusions after partial pulmonary excision secondary to a defect of re-expansion of the lung.

For a long time, they have been considered as a major complication that can have an impact on the postoperative course. The management is not consensual; it goes from compliance to thoracoplasty through drainage-irrigation. The objective of the study was to report the incidence of this complication in the lobectomies in our center by analyzing the factors of occurrence and the therapeutic and evolutionary modalities.

PATIENTS AND METHODS

This is a retrospective, analytical study of the residual cavities after pulmonary lobectomies collected in the Department of Thoracic Surgery and Cardio Vascular Fann during 14 years (from January 1, 2000 to December 31, 2014).

The objective was to report the frequency of this complication, to study and analyze the factors of occurrence, the therapeutic and evolutionary modalities. Data entry and analysis was done using the Epi-info Version 6.04 software; we used as a statistical test the chi-square.

A statistical link was sought between the occurrence of the residual pocket and the following elements:

- The type of pathology: an aspergilloma, a destroyed lobe.
- The type of selective intubation or not,
- Intraoperatively the need for pulmonary decortication, and the presence of a complete fissure,
- The surgical procedure: the type of lobectomy, the type of treatment of the bronchial stump, the realization of pneumoperitoneum

RESULTS

During the study, 17 patients presented a residual apical pocket after pulmonary resection in 123 patients followed for lobectomy. In the lobectomy series, the residual apical pocket was the most common complication (17 patients = 13.6%). All these patients were male with a mean age of 37 years. The majority of patients had a history of pulmonary tuberculosis 16/17 cases. The indication of the surgery was a pulmonary aspergillary transplant in 11 cases, a lobe destroyed on sequelae of tuberculosis in 4 cases and a dilatation of the bronchi in 2 cases, no case of surgery for neoplasia. The surgical procedure was a right superior lobectomy, 10 cases, a left superior lobectomy associated with a segmentectomy of the fowler in 6 cases and a superior bilobectomy. The surgery was performed under general anesthesia with non-selective oro-tracheal intubation in all patients.

All of these patients had persistent air leakage immediately postoperatively with an average drainage duration of 18 days (9d-29d). The evolution of the pockets was marked by pocket effacement in 5 patients, ie 29.4%, by compensatory hypertrophy of the pulmonary stump. The retraction of the pocket was found in 5 patients (29.4%), among whom 3 had developed a pachypleuritis.

Persistence of the pocket without modification was noted in 5 cases (29.4%); (Table I). We observed superinfection of the apical pocket in two patients. One had benefited from a thoracoplasty and the other had evolved well under treatment combining a daily irrigation washing of the pleural cavity and antibiotic therapy. The average time to follow residual pockets was 49 months with a minimum of 6 months and a maximum of 168 months.

Chi-square was used as a statistical test to investigate the factors that influence the occurrence of the residual cavity after lobectomy. Any value of P less than 0.05 means that there is a statistically significant link between the cross values.

Surgery of pulmonary aspergilloma was strongly presumptive to the occurrence of a residual pocket after lobectomy. The correlation is statistically significant with a P value = 0.04.This result is applicable to orotracheal intubation, upper lobectomy isolated or associated with Fowler segmentectomy with P values of 0.02, respectively; 0.001.

Pulmonary decortication, the presence of a complete fissure, the bronchial suture by separate points alone or associated with an overlock; reinforcement of the bronchial suture by a plasty using the parietal pleura, the realization of a postoperative pneumoperitoneum do not influence the occurrence of residual pocket. The link is not statistically significant

Table-I : Radiological evolution of residual pockets

Evolution of residual pockets	Ridership	Percentage (%)
Persistence of the apical pocket	5	29.4
Erasing the pocket	5	29.4
Superinfection	2	11.7
Retraction	5	29.4
Total	17	100

Table-II: Factors of residual pocket occurrence after lobectomies

	Residual pocket	link
Pulmonary aspergilloma	P=0.04	Yes
Lobe destroyed	P = 0.49	no
orotracheal intubation	P = 0.02	Yes
Selective intubation	P = 0.51	no
Incomplete fissure	P = 0.29	no
Superior lobectomy	P = 0.019	Yes
Superior lobectomy + segmentectomy of Fowler	p = 0.001	Yes
Pulmonary decortication	P = 0.16	no
Bronchial suture / separated spots	P = 0.39	no
Separate bronchial suture + overlock	P=0.12	no
Bronchial / pleural plasty	P = 0.21	no
Free air in abdomen	P = 0.18	no

DISCUSSION

The residual pockets are favored by the type of resection, the poor rehabitation of the remaining lung (pulmonary fibrosis, retraction of the visceral pleura). As a rule, these spaces are filled very gradually and are very well tolerated.

A number of factors must be taken into account before surgery to prevent these residual pockets

after lobectomy: performance status (PS); respiratory function; the quality of the lung parenchyma; the underlying disease; local or chronic infections [1].

Asymptomatic pockets disappear through the resorption of air, a better re-expansion of the remaining lung, an elevation of the diaphragm. In the presence of a bronchopleural fistula, spontaneous healing and resolution of an apical pocket is unlikely, especially if the latter is complicated by empyema [2].

Rocco [3] explains the occurrence of residual pockets after lobectomies by three mechanisms: Physiological residual pockets secondary to delay of suction of drains at closure of a thoracotomy by persistence of atmospheric air. The residual pockets secondary to a defect of re-expansion of the remaining pulmonary lobe found in the surgery sequelae of tuberculosis causing a fibrous and sclerous lung.

And finally the active residual pockets secondary a significant air leak in the areas of sutures or parenchymal fissures after pulmonary excision. Following this, he recommends preventive measures per-operatively to reduce the occurrence of residual pockets. As a rule, these spaces are filled very gradually and are very well tolerated. More rarely, the increased space associated with fever and leukocytosis causes fear of infection of the pleural pocket [4].

Our results are similar to that of Okur [5], which indicates a higher incidence of residual pockets in the sequelae of tuberculosis (21 to 33%). The same author concluded that patients with segmentectomy, superior lobectomy and bilobectomy have a higher incidence of residual pocket occurrence as in our series.

We have found that, whatever the technique of suture and treatment of the bronchial stump, the residual pocket can be observed. The same observation was made by Kendja [6].

Solak O [7] found in 58 patients a residual cavity after lobectomy. In his series, the majority of residual cavities (76%) are completely cleared during the monitoring period (1 month). In our series we observed an erasure of the pocket in 29.4%.

He reports a persistence of the pocket in 10% of the cases and 14% of the pocket cases are infected requiring drainage or a reintervention. These complications occurred 3 to 4 weeks after lobectomy. In our series we observed a persistence of the pocket without modification in 29.4% and in 11.7% of cases a superinfection of the apical pocket, one of which required a thoracoplasty after failure of irrigation-washing treatment. The other has evolved through daily irrigation-washing of the pleural cavity coupled with antibiotic therapy.

Barker [2] has taken a conservative, thoughtful, more conservative approach to residual cavities for two reasons. On the one hand, premature intervention can lead to iatrogenic complications and, on the other hand, surgery will not be necessary until several months after the onset of an apical pocket. It offers careful monitoring of clinical and radiological criteria. We adopted the same attitude which allowed us to observe a persistence of the pocket without modification in 29.4% of the cases and a retraction of the pocket in 29.4% cases.

Overall, the evolution of the pockets is favorable under surveillance in 88.2% of our patients. Thoracoplasty is a recovery option for the rare cases of complicated apical pocket. It can be an effective tool for solving complicated pockets in carefully selected patients. Indeed, Rocco [8] treated three patients with thoracoplasty who presented a persistent residual pocket after pulmonary resection.

In the light of our results, we believe that thoracoplasty immediately after lobectomy is not necessary; this thoracoplasty from the outset is intended to prevent the occurrence of residual cavities. However, despite the absence of thoracoplasty immediately after pulmonary lobectomy; the residual apical pockets observed in our series have evolved well by simple clinical radiological monitoring. Nevertheless two patients (11.7%) presented superinfection of the residual pocket. Management consisted of: in the first patient, thoracoplasty performed after treatment with irrigation-washing of the pleural cavity coupled with appropriate antibiotic therapy. The second patient evolved well by washing-irrigation of the pleural cavity coupled with a suitable antibiotherapy. These results lead us to recommend this conservative attitude which consists of a clinical radiological monitoring of the residual pockets. Like Barker [2], we recommend thoracoplasty in cases of apical pocket superinfection after failure of washing-irrigation treatment and appropriate antibiotherapy. Our attitude is similar to that of Massard [9], who advocates drainage-washing with a chest tube in the management of the post-operative pyothorax, followed by the preparation of a thoracoplasty when the infection persists. Caidi [10] recommends pleural drainage with the implementation of irrigation - washing system in the absence of associated bronchial fistula, coupled with appropriate antibiotherapy. In case of failure, a thoracostomy can be performed while waiting for a thoracoplasty that will ensure a definitive sagging of the cavity.

CONCLUSION

Monitoring an asymptomatic residual pocket after lobectomy without resorting to unnecessary aggression requires proven experience and expertise. As a fundamental principle of medicine teaches us: "Patients are treated, not radiological images"

For Rocco the management of residual pockets after lobectomies is an art that conclusively determines the maturity of the thoracic surgeon.

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