First case of bronchiolar-pleural fistula repair with platelet-leukocyte rich gel

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Abstract. – Bronchiolar-pleural fistulas are a frequent complication of thoracic surgery. Current treatment strategies and their invasiveness are quiet different, but often surgeons decide for a new surgical intervention and definitive closure of the breach. We report the case of a bronchiolar-pleural fistula in a 75 years old man with important co-morbidities that we treated with installation of platelet-leukocyte rich gel (PLR-G). We discuss actual indications for PLR-G as well as its possible role in thoracic surgery.

Key Words: Bronchiolar-pleural fistulas, Platelet-leukocyte rich gel, Wound healing, Thoracic surgery complications.

Introduction

Bronchiolar-pleural fistulas are a not infrequent and often under-rated complication after major thoracic surgery. Current accepted treatment options are quite different, going from simple drainage of little pneumothorax which often requires months to heal completely to re-interventions and surgical closure of the breach. Dyspnea is the main symptom of this condition, with low partial saturation of oxygen, paroxysmal thoracic pain and weakness1-3.

Case Report and Literature Review

We report the case of a 75 years old white man, who underwent a surgical intervention of bullectomy with pulmonary decortication for a giant emphysematous bulla developed after talc pleurodesis. This procedure caused a deformity of the right half of the thoracic wall, with subsequent back-ache and dyspnea. The initial diagnosis after physical examination was a thoracocoele, for which we planned a computed tomography (CT) scan. The CT scan (Figure 1) showed the presence of a communication between the respiratory tree and the back deformity, so we modi-fied our diagnosis in bronchiolar-pleural fistula. We excluded a surgical intervention because of the patient’s general conditions (cardiac insufficiency, emphysematous chronic obstructive pulmonary disease (COPD), depressive disorder), and because of the high risk of injuries to the pleural surface, already thickened from the previous interventions.

This lead to a revisitation of the scientific literature. We focused our attention on the PLR-G (platelet leukocyte rich gel), which has showned important properties in wound healing and is gaining fastly new indications4. Main indications for the PLR-G are wound healing and bone tissue regeneration, but many modern works have been produced showing the different fields in which this material might be helpful. These concern general, orthopedic, maxillofacial and reconstructive surgery: chronic nonhealing (diabetic) wounds, tendon and ligament ruptures, joint capsular injuries, endoscopic sinus surgery, abdominal wall and inguinal hernia repair (reducing the appearance of postoperative pain and surgical site infection)5,6. However, the PLR-G has never previously been used for bronchiolar pleural fistula repair and rare indications have been found in literature for thoracic surgery. Nonetheless, we found that the properties of stimulation of cicatrization, acceleration of tissue regeneration and wound closure and antibacterial efficacy were the perfect mean to guarantee a safe and less-invasive repair7.

Materials and Methods

Preparation

The patient underwent an authologous procedure with the cell-separator Haemonetics®, Brain-tree, USA. After one hour with disposable 971E we obtained 65 ml of leucoplatelet concentrate and 200 ml of plasma. The concentrate was made...
After 2 days from the first intervention the patient felt better, with partial resolution of dyspnea, elevation of oxygen-saturation, and general improvement. The deformation of the chest, measured each day, showed a progressive decrease of diameter (almost 10-15% after 2 days from the first intervention, 50% at 2 days from the second intervention, with almost total disappearance 24 days from the first instillation).

**Discussion**

While bronchopleural fistulas are a well known and discussed problem in thoracic surgery, with a prevalence of 2% of patients undergoing pneumonectomy/lobectomy, bronchio-

**Figure 1.** CT scan performed at initial assessment. Arrows indicate air communicating from pleural space to the back.

**Figure 2.** Radiography of the chest after first gel injection. Blue arrow indicates the pigtail catheter; yellow arrows indicate residual air and red arrow indicates gel inside the cavity.

**Figure 3.** CT scan performed two weeks after last gel injection.
lar pleural fistulas are difficult to be detected\textsuperscript{1-3}. They probably have a higher frequency rate but often are not recognized and heal without intervention. Major bronchopleural fistulas usually require thoracotomy and repair of fistula reinforced with omental or intercostals muscle patch. A thoracoplasty, sometimes, may be required to obliterate the postpneumonectomy space\textsuperscript{3}. This kind of intervention is not free of risks for the patient, specially if he has concomitant diseases that impair wound healing or compromise his general conditions, or if he has undergone previous surgical procedures that have modified the pleural consistence and strenght (i.e. talc pleurodesis, decortication).

Bronchiolar pleural fistulas repair has required different kind of interventions: little pneumothorax may require simple drainage and observation. A Heimlich valve helps to get to resolution. This management involves both a high frequency of failures and weeks or months during which the patient complains symptoms. A further possible treatment is a surgical re-intervention with closure of the breach\textsuperscript{1,3}. Anyway, there is difficulty in detecting the breach and the common thickness of the tissues because of the previous procedures usually complicate the outcome of the intervention, which often concerns old and fragile patients.

Less invasive procedures are necessary to heal bronchiolar pleural fistulas, to face and reduce the length of hospitalization and to guarantee a minor appearance of infections. Recent works are reviewing the frequency of post-pneumonectomy fistulas and discussing possible indications for sealant glues\textsuperscript{10}. We believe that PLR-G can be considered as a valid treatment option.

**Conclusions**

The use of autologous PLR-G in surgery is gaining everyday more importance because it has demonstrated to be a safe, fast and conservative procedure which minimizes the negative effects of surgical interventions and gives more importance to the reconstructive aspect. A good quantitative of highly concentrate cells is obtained in few procedures (in our case only one), without growing factors, which means less expensiveness: our technique required less than 200 dollars for the gel production. This multidisciplinary approach to a often under-rated but disabling disease has shown interesting properties, including short length of hospitalization, less expensive procedures and minor appearance of infections. The PLG, thus, can optimize the effects of antibiotic treatment playing a “adjuvant role” in infected fistula healing.

**References**