



## Case report

## Diffuse alveolar hemorrhage after gadolinium injection during a MRI



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## ABSTRACT

Gadolinium is a frequently used contrast product for MRI exam. It is well known to be less immuno-reactive than iodine used in tomodensitometry but its safety is not completely exempt of secondary effect. Here we report one case of acute interstitial pulmonary toxicity due to gadolinium. After quick elimination of others possible diagnosis and broncho-alveolar lavage we establish the link between acute intra-alveolar hemorrhage and gadolinium injection.

## 1. Introduction

Magnetic Resonance Imagery (MRI) is a frequently used technique to acquire high precision images. Gadolinium, usual contrast medium in MRI, has been recently a topic of interest for European Medical Agency (EMA) and it is now recognized some long-term side effects as accumulation in brain, liver, bones or muscles. About acute side effect, we especially know anaphylactic reactions. We present a new acute side effect occurring in a 62 year old woman without relevant medical history.

## 2. Case report

On August 2019, a 62 years woman was admitted to our post-urgence department for acute dyspnea. Patient's medical history included Quincke oedema of unknown origin during childhood and chronic headache treated punctually with Triptans and gastric reflux treated with Sodium alginate powder. No tobacco intoxication was noted. No family history of pulmonary disease was reported. She worked as psychologist.

After re-building the events, it appeared that she presented brutal dyspnea less than 30 min after MRI (which one was unremarkable, realised in order to explore the headache).

At emergencies, she presented oxygen saturation at 87%, tachycardia (106 beats/minute), normal blood pressure and was subfebrile (37.5 °C). Clinical examination revealed crackles in both lung. We didn't

reported any cutaneous, rheumatoid manifestations past or present plaiding for systemic disease.

No clinical sign of cardiac failure was noted. In front of dyspnea and tachycardia pulmonary embolism possibility was investigated. Considering the D-dimer level (7593 ng/mL), vascular tomodensitometry was realised and didn't report thromboembolic event. However, it found diffuse ground-glass opacities with perihilar distribution.

Standard biology showed hemoglobin 15.2g/dL, leucocytes 4 G/L (neutrophils 3.2G/L), no hydroelectrolytic or renal function impairment (creatinine 77 µmol/L).

We first eliminated infectious events with multiplex Polymerase Chain Reaction looking for respiratory virus and intracellular bacteria (*Chlamydia pneumoniae*/*Mycoplasma pneumoniae*) both were negative. *Legionella pneumophila* and *Streptococcus pneumoniae* antigenuria were negative. No expectoration was obtained.

Cardiac failure was first eliminated with negative troponine (<3 ng/L) and NT-pro-Brain Natriuretic Peptide (NT-pro-BNP) (380 ng/L) levels. Electrocardiogram was unremarkable with sinus rhythm pattern without any trouble of repolarization. The transthoracic echocardiography showed no signs of cardiac dysfunction (FEVG 56%, any hypertrophy of ventricles, no valvulopathy or sign of pulmonary hypertension).

Autoimmune disease was finally investigated, even in absence of systemic symptoms: Anti-Neutrophil Cytoplasmic Antibodies (ANCA), anti-nuclear antibody (ANA), rheumatoid factor and anti-citrulline peptide antibody were negative. Protein electrophoresis was normal.

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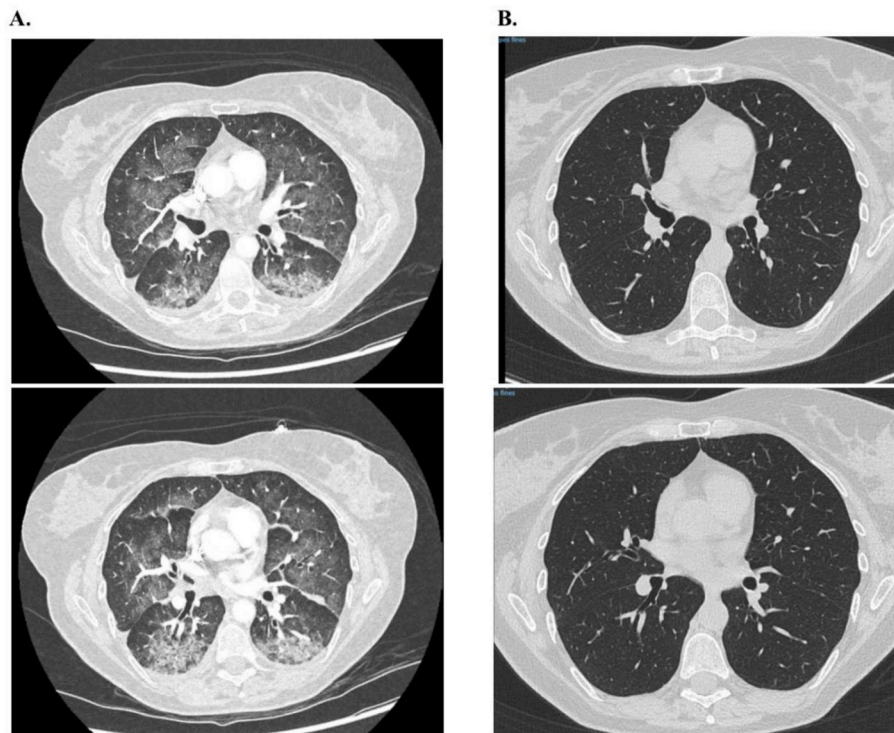
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**Fig. 1.** Thoracic tomodensitometry of our patient, showing pulmonary reaction after gadolinium injection. **(A)** Thoracic tomodensitometry 2 h after gadolinium injection. **(B)** Evolution of thoracic tomodensitometry aspect after one month.

Calcium, phosphate and D-vitamin rates were normal.

In front of ground-glass opacities without cardiac origin, we realised bronchoscopy and bronchoalveolar lavage (BAL).

Bronchoscopy was unremarkable (no bronchial intra-luminal process). BAL was pinky and reported no visible germs, no Acid Resistant Bacilli (BAR), no pneumocystis cysts.

Cytologic exams showed majority of neutrophils, consistent with infectious or iatrogenic disease.

Considering the BAL realised in less than 72 hours after beginning of the symptoms, we concluded to diffuse diffuse alveolar hemorrhage (DAH) and completed biological exams with anti-Glomerular Basement Membrane antibody research, which was negative.

The patient was under oxygen, quickly stopped after 24 h. Symptoms spontaneously disappeared. Even in absence of bacterial cause, because of subfebrile dyspnea, we empirically introduced an Amoxicillin (1 g x 3 per day) during seven days.

At the one-month consultation (27 september 2019), the patient didn't report any dyspnea. A thoracic tomodensitometry showed clearance of all pathological previous findings (Figure 1).

### 3. Discussion

DAH is classically defined by gold score higher than 100 (considering stained hemosiderin-laden macrophages in BAL) [1]. However, it was proved that absence of hemosiderin doesn't exclude possibility of recent (less than 72 hours) pulmonary hemorrhage in front of bloody secretions [2].

Considering time-course after gadolinium injection in our case and lack of other diagnosis we can reasonably sustained good intrinsic accountability.

We investigate extrinsic accountability with screening on "Pneumotox" [3], French database collecting pulmonary secondary effects of drugs. With gadolinium, only two types of effects were reported: hypersensitivity reactions (may involve skin, throat or airways) until anaphylaxis and Acute Respiratory Distress Syndrome (ARDS). It is

known that ARDS [4] isn't well-characterized disease entity and can correspond to diverse mechanisms (pulmonary oedema, acute NSIP-like interstitial lung disease, alveolar damage) in which diffuse DAH could be included.

It necessary to see that in our case, the patient didn't go to reanimation and didn't fully correspond to ARDS criteria.

In Pubmed, no case report of demonstrated diffuse DAH after gadolinium injection was found. There, it would be one of the first case proved. It is very probable that some attenuated cases are not known or misclassified into cardiac dysfunction or infectious pneumopathy.

Here, due to the initial desaturation, we have had the chance to make quick investigation in order to eliminate all differential diagnosis.

### 4. Conclusion

Here, we reported one case of DAH after gadolinium injection and cannot found any other case reported but it is probably under-diagnosed effect.

To conclude, it seems necessary to take care of patients in the few 30 min after a MRI, looking for respiratory symptoms demasking immunoreactive process to gadolinium. Even if our case has had favorable evolution, it seems possible, especially for patient with poor chronic respiratory condition, to have acute respiratory failure until death.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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