A case series on acute pulmonary embolism in COVID-19 patients: French to English translation and commentary

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Abstract

In early 2020, researchers proposed a possible link between COVID-19 and acute pulmonary embolism. The article *Embolie pulmonaire chez des patients atteints de COVID-19 : à propos de 6 cas* by Steeman et al. presents six cases of acute pulmonary embolism in the context of COVID-19 in Ardennes, Belgium from March to April 2020.

This paper consists of a French to English translation of this case series and a detailed commentary. Steps of the translation process are discussed, such as analysing the source text, writing a translation commission, and drafting the target text. Important considerations include journal in-house guidelines, scientific discourse, and the use of translation technology. The second half of the commentary focuses on translation problems and solutions, namely linguistic differences between French and English, numerical information, and medical terminology.

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I would like to thank my supervisor, Samuel Strong, for his help and guidance on this project and throughout the academic year.

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List of Abbreviations

ST – Source Text

TT – Target Text

CT – Computed Tomography

COVID-19 – Coronavirus Disease 2019

SARS-CoV-2 – Severe Acute Respiratory Syndrome Coronavirus 2

PE – Pulmonary Embolism

Translation

Embolie pulmonaire chez des patients atteints de COVID-19 : à propos de 6 cas

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Résumé :

Depuis la fin de l'année 2019, le monde est frappé par une épidémie causée par le virus SARS-CoV-2. La maladie à coronavirus 2019 se manifeste dans la majorité des cas par de la pyrexie, de la toux, de la dyspnée, des myalgies et de la fatigue. Néanmoins, elle peut aussi se présenter sous des formes plus sévères, allant de la pneumopathie hypoxémiante jusqu'à l'insuffisance respiratoire et à la défaillance multiorganique. Des études récentes suggèrent que l'infection à SARS-CoV-2 prédispose aux événements thromboemboliques. Bien que l'incidence de l'embolie pulmonaire dans le cadre de la maladie à corona- virus soit inconnue, elle constitue une complication potentiellement fatale. L'embolie pulmonaire peut être difficile à mettre en évidence car les signes et symptômes peuvent être similaires et se confondre avec ceux d'une pneumopathie à SARS-CoV-2. Nous rapportons 6 cas d'embolie pulmonaire associée à une pneumopathie à SARS-CoV-2.

Mots-clés : COVID-19 - SARS-CoV-2 - Coronavirus - Embolie pulmonaire - Thrombose veineuse profonde

Six cases of acute pulmonary embolism in patients with COVID-19

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Abstract

Coronavirus disease 2019 (COVID-19) can cause severe respiratory distress syndrome requiring intensive care. Recent studies suggest that SARS-CoV-2 infection predisposes to thromboembolic events such as pulmonary embolism. The overlap between signs and symptoms of pulmonary embolism and COVID-19 presents a diagnostic challenge and could potentially be fatal. This case series describes six cases of pulmonary embolism associated with COVID-19. Based on our findings, we suggest administering prophylactic anticoagulation to all patients hospitalised with COVID-19.

Keywords: Coronavirus; COVID-19; Deep vein thrombosis; Pulmonary embolism; SARS-CoV-2

Introduction

Depuis décembre 2019, la maladie à coronavirus 2019 (COVID-19) causée par un nouveau coronavirus, le SARS-CoV-2, frappe le monde (1).

Le plus souvent, la COVID-19 se manifeste par de la pyrexie, de la toux, de la dyspnée, des myalgies, de la fatigue. Les patients peuvent aussi présenter de la diarrhée, des céphalées, des expectorations et des hémoptysies. Dans la majorité des cas (81 %), les malades développent une forme modérée (avec ou sans pneumonie). La pneumonie apparaît être la plus sérieuse manifestation de l'infection. Ainsi, 14 % des patients présentent une forme sévère de la maladie avec dyspnée et hypoxie et 5 % d'entre eux présentent une myocardite, une insuffisance respiratoire, un état de choc ou une défaillance multiorganique (2).

Bien que cette pathologie soit connue pour provoquer un état pro-inflammatoire et d'hypercoagulabilité, estimer le risque thromboembolique reste toutefois difficile compte tenu des différentes stratégies diagnostiques et préventives locales (3). Dans la littérature, l'incidence des événements thromboemboliques (embolie pulmonaire et thrombose veineuse profonde) varie entre 1,6 % et 2,4 % chez les patients aigus hospitalisés et de 3,3 % à 31 % chez les patients critiques (3-6).

Dans ce travail, nous présentons 6 cas d'embolie pulmonaire mise en évidence chez des patients atteints du COVID-19 dans notre centre hospitalier entre le 15 mars et le 30 avril 2020. Les caractéristiques des patients sont représentées dans le Tableau I.

1. Introduction

Since December 2019, people worldwide have been affected by coronavirus disease 2019 (COVID-19) caused by the new coronavirus, SARS-CoV-2 [1].

The most common symptoms of COVID-19 are fever, cough, dyspnoea, myalgia, and fatigue. Patients may also have diarrhoea, headaches, sputum and haemoptysis. Most cases (81%) are moderate and may be accompanied by pneumonia, which seems to be the most serious manifestation of disease. Meanwhile, 14% of patients develop severe illness with dyspnoea and hypoxia, and 5% develop myocarditis, experience respiratory failure, shock, or multiple organ dysfunction syndrome [2].

Although COVID-19 is known to trigger a proinflammatory and hypercoagulable state, it remains difficult to estimate the risk of thromboembolism given the different diagnostic strategies and preventive measures of local health systems [3]. According to the literature, the incidence of thromboembolic events (pulmonary embolism and deep vein thrombosis) is between 1.6% and 2.4% in patients in acute care, and between 3.3% and 31% in critically ill patients [3-6].

In this paper, we present 6 cases of pulmonary embolism in COVID-19 patients in our hospital between 15 March and 30 April 2020. Patient characteristics are presented in Table 1.

Cas clinique 1

Une femme de 58 ans est envoyée aux urgences pour une dyspnée d'apparition brutale associée à une douleur basithoracique droite. Ses antécédents notables sont une hypothyroïdie substituée et une hypertension artérielle traitée par inhibiteur de l'enzyme de conversion de l'angiotensine.

La patiente avait été hospitalisée auparavant pour une insuffisance respiratoire légère dans un contexte de COVID-19 diagnostiqué sur base d'une PCR (Polymerase Chain Reaction) SARS-Cov-2 et d'un scanner thoracique compatible avec une pneumonie virale. Durant son hospitalisation, la patiente a bénéficié d'un traitement par oxygène et hydroxychloroquine. Évoluant favorablement, elle avait pu regagner son domicile après 4 jours d'hospitalisation.

Sept jours après sa sortie d'hospitalisation, la patiente se présente aux urgences. A l'admission, elle est pâle, apyrétique et présente une douleur aiguë basithoracique droite irradiant dans l'hypochondre et le flanc droit. A l'examen physique, on note une température à 37,3°C, un rythme cardiaque à 96 battements par minute (BPM) et une saturation à l'air ambiant de 97 %. L'auscultation cardiopulmonaire est banale.

La biologie montre un syndrome inflammatoire (Tableau II) et une élévation des D-dimères (1,91 mg/l). La gazométrie (Tableau III) et l'électrocardiogramme (ECG) sont aspécifiques. L'examen microscopique et l'analyse des urines sont également sans particularité.

2. Case presentations

2.1. Case 1

A 58-year-old woman was sent to emergency with a sudden onset of dyspnoea associated with right-sided lower chest pain. Her relevant medical history included hypothyroidism treated with hormone replacement therapy and high blood pressure treated with angiotensin-converting enzyme (ACE) inhibitors.

The patient had a prior hospitalisation for mild respiratory failure in the context of COVID-19, diagnosed by a PCR (Polymerase Chain Reaction) test for SARS-CoV-2 and a chest CT scan indicative of viral pneumonia. During her hospital course, the patient had responded well to oxygen therapy and hydroxychloroquine. Her condition had improved and she had been discharged after 4 days in the hospital.

Seven days after discharge, the patient presented to the emergency department. On admission, she was pale, afebrile, and was complaining of acute right-sided lower chest pain radiating to the right hypochondrium and right flank. On exam, her temperature was 37.3°C, her heart rate was 96 beats per minute (BPM), and her oxygen saturation was 97% on room air. Auscultation of the heart and lungs was normal.

Laboratory results showed signs of inflammation (Table 2) and an increase in D-dimers (1.91 mg/l). Arterial blood gases (ABG) (Table 3) and electrocardiogram (ECG) were non-specific. Blood culture and urinalysis were also unremarkable.

Devant l'augmentation des D-dimères, le bilan est complété par un angioscanner thoracique qui révèle la présence d'une embolie pulmonaire bilatérale à prédominance droite où l'on retrouve des thrombus au sein des différentes artères segmentaires des trois lobes à droite ainsi qu'au niveau soussegmentaire du segment postérieur du lobe inférieur gauche.

Sur le scanner thoracique, on note également la présence d'un infarctus pulmonaire périphérique du segment latéral du lobe inférieur droit, des infiltrats pulmonaires en verre dépoli périphériques plurifocaux dans le contexte d'une pneumopathie à COVID-19 ainsi qu'un épanchement pleural bilatéral de faible abondance et une lamelle d'épanchement péricardique.

L'échographie cardiaque transthoracique ne révèle pas de signe de cœur pulmonaire droit aigu. Il n'y pas eu d'échographie doppler des membres inférieurs réalisée aux urgences. Par la suite, la patiente est hospitalisée avec un traitement anticoagulant à base d'héparine de bas poids moléculaire (HBPM). L'évolution est favorable durant l'hospitalisation.

Cas clinique 2

Une femme de 78 ans se présente aux urgences pour pyrexie associée à de la toux ainsi qu'une asthénie, des myalgies, des céphalées et une perte d'appétit depuis 10 jours. Dans les antécédents, on note une hypertension et une hypercholestérolémie traitées.

A l'admission, on note une pyrexie à 38,9°C, une fréquence cardiaque à 73 BPM, une pression artérielle à 140/80 mmHg et une saturation en oxygène à l'air ambiant mesurée à 93 %. L'auscultation cardiopulmonaire révèle des râles crépitants aux deux bases.

Given the elevated D-dimers, a chest CT angiogram was ordered and revealed a bilateral pulmonary embolism primarily affecting the right side. Thrombi were found in various segmental arteries in the three right lobes and at the subsegmental level in the left lower lobe posterior segment.

Chest CT scan also showed a peripheral pulmonary infarction in the right lower lobe lateral segment, multifocal peripheral ground glass opacities consistent with COVID-19, as well as mild bilateral pleural effusion and a small pericardial effusion.

Transthoracic echocardiogram (TTE) did not show signs of acute right-sided heart failure. A Doppler ultrasound of the legs was not done in the emergency department. The patient was admitted and started on low-molecular-weight heparin (LMWH) anticoagulant therapy. She progressed well during admission.

2.2. Case 2

A 78-year-old woman presented to emergency with a fever associated with cough, asthenia, myalgia, headache, and a loss of appetite ongoing for 10 days. In terms of medical history, she was being treated for high blood pressure and high blood cholesterol.

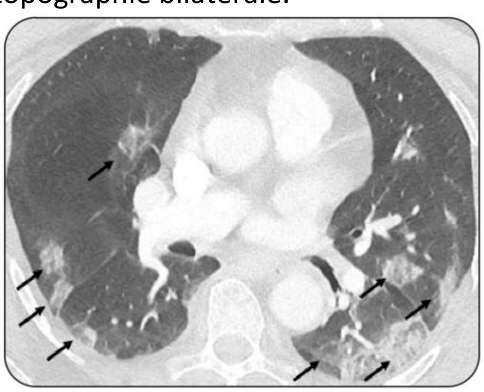
On admission, she had a 38.9°C fever, her heart rate was 73 BPM, her blood pressure was 140/80 mmHg, and her oxygen saturation was 93% on room air. Bilateral basal crackles were heard on auscultation.

Le reste de l’examen physique est sans particularité. La biologie (Tableau II) met en évidence une lymphopénie, des D-dimères à 1,19 mg/l, une CRP à 73 mg/l et une hypoxémie à 59,9 mmHg à la gazométrie (Tableau III). L’ECG montre un bloc de branche gauche connu et le QT est supérieur à 500. L’analyse d’urine est sans particularité. La PCR SARS-CoV-2 est positive.

Le scanner thoracique, réalisé avec injection de produit de contraste (Figure 1), révèle la présence de deux emboles pulmonaires non occlusifs au niveau des branches des divisions lobaires inférieures bilatérales. La fenêtre pulmonaire met en évidence de multiples infiltrats en verre dépoli, de topographie bilatérale et sous-pleural, évoquant une pneumopathie COVID-19.

L’échographie cardiaque transthoracique ne révèle pas la présence de signe de cœur droit pulmonaire aigu. La patiente est hospitalisée avec un traitement anticoagulant par HBPM. L’évolution est favorable durant l’hospitalisation.

Figure 1. Scanner thoracique mettant en évidence, en fenêtre pulmonaire, la présence de multiples infiltrats en verre dépoli de topographie bilatérale.



The rest of the physical exam was unremarkable. Laboratory results (Table 2) indicated lymphopenia, D-dimers at 1.19 mg/l, and CRP at 73 mg/l. An ABG test measured the partial pressure of oxygen at 59.9 mmHg, indicating hypoxaemia (Table 3). ECG showed a known left bundle branch block and a QT interval over 500. Urinalysis was unremarkable. A PCR test returned positive for SARS-CoV-2.

Chest CT scan with contrast (Fig. 1) showed two non-occlusive pulmonary emboli in the branches of bilateral lower lobes. The lung window showed multiple bilateral and subpleural ground glass opacities, consistent with COVID-19.

TTE did not show signs of acute right-sided heart failure. The patient was admitted and started on LMWH anticoagulant therapy. She progressed well during admission.

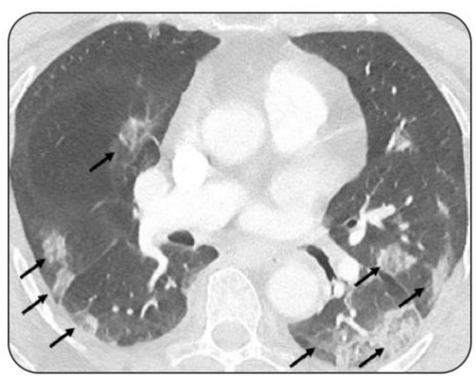


Fig. 1
Lung window of chest CT scan showing multiple bilateral ground glass opacities.

Cas clinique 3

Un homme de 37 ans, sans antécédent notoire, est amené aux urgences pour malaise avec perte de connaissance sans prodrome.

Lors de sa présentation aux urgences, le patient se plaint de nausées et de céphalées holocrâniennes. On objective une pyrexie à 37,9°C. Le reste des paramètres, l'examen physique et neurologique sont sans particularité.

La biologie (Tableau II) montre une lymphopénie, des D-dimères à 5,30 mg/dl, une CRP à 19 mg/l et la gazométrie montre une alcalose respiratoire (Tableau III). La recherche d'antigène COVID-19 ainsi que la PCR SARS-CoV-2 sur le frottis nasopharyngé sont négatives. L'analyse des urines est, quant à elle, banale.

Le scanner cérébral à blanc réalisé aux urgences est sans particularité. Le scanner thoracique, d'emblée réalisé avec injection de produit de contraste, révèle une embolie artérielle pulmonaire, intéressant plusieurs branches segmentaires et sous-segmentaires au sein du lobe inférieur gauche, associée à la présence d'autres emboles au sein de deux branches artérielles sous-segmentaires du lobe inférieur droit.

En fenêtre pulmonaire, on distingue plusieurs plages en verre dépoli accompagnées de plages de pneumopathie en périphérie et en région sous-pleurale du lobe inférieur droit, compatibles avec une pneumopathie de type COVID-19 débutante.

Le patient est hospitalisé en vue d'initier une anticoagulation par HBPM. L'évolution est favorable durant l'hospitalisation.

2.3. Case 3

A 37-year-old man with no significant medical history was brought to emergency for syncope without prodrome leading to loss of consciousness.

Upon arrival at emergency, the patient complained of nausea and holocranial headache. He had a fever of 37.9°C. The rest of his vital signs, physical and neurological exams were unremarkable.

Laboratory results (Table 2) indicated lymphopenia, D-dimers at 5.30 mg/l, and CRP at 19 mg/l. ABG revealed respiratory alkalosis. Both a COVID-19 antigen test and a SARS-CoV-2 PCR test via nasopharyngeal swab returned negative. Urinalysis was normal.

Brain CT scan without contrast done in the emergency department was unremarkable. Chest CT scan, performed straight away with contrast, revealed a pulmonary embolism affecting several segmental and subsegmental branches of the left lower lobe. Other emboli were found in two subsegmental branches of the right lower lobe.

In the lung window, many ground glass opacities and areas of pulmonary consolidation in the periphery and subpleural region of the right lower lobe were observed. These findings are consistent with early COVID-19.

The patient was admitted and started on LMWH anticoagulant therapy. He progressed well during admission.

Cas clinique 4

Une femme de 40 ans, sans antécédent notoire, se présente aux urgences pour une dyspnée avec douleur latérothoracique droite depuis 5 jours.

Lors de son admission, la patiente est eupnéique et apyrétique. On objective une tachycardie à 130 BPM, une hypoventilation et des râles crépitants à la base pulmonaire droite ainsi qu'une sensibilité basithoracique droite à la palpation. Le reste de l'examen physique est sans particularité.

A la biologie (Tableau II), on note des D-dimères à 6,63 mg/dl, une CRP à 145 mg/l ainsi qu'une légère hypoxémie (PaO2 70,1 mmHg) à la gazométrie (Tableau III). L'ECG montre une tachycardie à 112/min. La recherche d'antigène COVID-19 est négative ainsi que la PCR SARSCoV-2. L'analyse des urines est banale.

Le scanner thoracique avec injection de produit de contraste révèle une embolie artérielle pulmonaire bilatérale, assez importante, intéressant, du côté droit, la plupart des branches de division de l'artère pulmonaire, ainsi que de nombreuses branches segmentaires et sous-segmentaires et, du côté gauche, plusieurs branches artérielles pulmonaires centrales, segmentaires, sous-segmentaires.

On note, également, un épanchement pleural droit ainsi que des plages de verre dépoli périphériques et sous-pleurales à hauteur des deux lobes supérieurs et du lobe moyen, compatibles avec une pneumopathie liée au COVID-19.

La patiente est hospitalisée afin de débuter une anticoagulation. L'évolution est favorable durant l'hospitalisation.

2.4. Case 4

A 40-year-old woman with no significant medical history presented to emergency with dyspnoea associated with right-sided lateral chest pain ongoing for 5 days.

On admission, the patient was eupnoeic and afebrile. She had a tachycardia of 130 BPM and was hypoventilating. Basal crackles were noted in the right lung as well as tenderness of the lower right chest on palpitation. The rest of the physical exam was unremarkable.

Laboratory results (Table 2) indicated D-dimers at 6.63 mg/l, and CRP at 145 mg/l. ABG indicated mild hypoxaemia with a PaO2 of 70.1 mmHg (Table 3). ECG measured a tachycardia of 112 BPM. Both a COVID-19 antigen test and a SARS-CoV-2 PCR test returned negative. Urinalysis was normal.

Chest CT scan with contrast revealed a rather large bilateral pulmonary embolism affecting most of the branches of the right pulmonary artery, including many segmental and subsegmental branches. On the left side, many main branches of the pulmonary artery were affected along with segmental and subsegmental branches.

We also noticed a right pleural effusion and subpleural ground glass opacities in the periphery of bilateral upper lobes and the middle lobe, consistent with COVID-19.

The patient was admitted and started on anticoagulant therapy. She progressed well during admission.

Cas clinique 5

Un homme de 78 ans avec, comme antécédent, un asthme à l'effort, est admis aux urgences pour un arrêt cardiaque au domicile consécutif à un malaise avec douleur thoracique. Après 20 minutes de réanimation cardiaque extrahospitalière et une intubation endotrachéale, le patient récupère une circulation spontanée et est transféré vers l'hôpital.

Lors de son arrivée aux urgences, le patient est sédaté et intubé. La biologie (Tableau II) montre un syndrome inflammatoire, une augmentation des D-dimères (25 mg/l), une insuffisance rénale, une altération des enzymes hépatiques, une augmentation de la bilirubine ainsi que de la ferritine. La gazométrie (Tableau III), réalisée sous ventilation artificielle, montre une acidose respiratoire. L'ECG révèle une fibrillation auriculaire avec réponse ventriculaire située aux alentours de 130/minute. La PCR SARS-CoV-2 est positive.

Le scanner thoracique, avec injection de produit de contraste (Figure 2), révèle une embolie pulmonaire bilatérale massive, des condensations pneumoniques alvéolaires bibasales, surtout à gauche, et des images en verre dépoli compatibles avec une pneumopathie COVID-19. L'échographie cardiaque transthoracique objective une hypertension artérielle pulmonaire, avec un gradient oreillette droite ventricule droit mesuré à 45 mmHg, un péricarde normal et une veine cave inférieure dilatée avec collapsus inspiratoire.

Le patient est transféré aux soins intensifs pour la poursuite de sa prise en charge. L'évolution est favorable durant l'hospitalisation.

2.5. Case 5

A 78-year-old man with a history of exercise-induced asthma was admitted to emergency after suffering a cardiac arrest at home, preceded by syncope with chest pain. After 20 minutes of out-of-hospital CPR and an endotracheal intubation, return of spontaneous circulation was achieved and the patient was transferred to the hospital.

Upon arrival to emergency, the patient was sedated and intubated. Laboratory results (Table 2) showed signs of inflammation, elevated D-dimers (25 mg/l), renal failure, liver enzyme alteration, and elevated bilirubin and ferritin. An ABG test performed under mechanical ventilation showed respiratory acidosis. ECG revealed an atrial fibrillation with rapid ventricular response (130/minute). A PCR test returned positive for SARS-CoV-2.

Chest CT scan with contrast (Fig. 2) showed a massive bilateral pulmonary embolism, lung congestion in bibasilar alveoli, especially on the left side, and ground glass opacities consistent with COVID-19. TTE showed pulmonary hypertension with a right ventricular-right atrial gradient of 45 mmHg. The pericardium was normal and the inferior vena cava was dilated with inspiratory collapse.

The patient was transferred to intensive care for further treatment. He progressed well during admission.

Figure 2. Angioscanner thoracique avec embolie pulmonaire bilatérale

Fig. 2
Chest CT angiogram showing bilateral pulmonary embolism.

Cas clinique 6

Un homme de 64 ans, sans antécédent notoire, se présente aux urgences pour une dyspnée associant une douleur basithoracique droite apparue brutalement à son domicile.

Le patient avait été hospitalisé 10 jours auparavant pour une pneumonie hypoxémiante à SARS-CoV-2. Il avait évolué favorablement sous traitement à base d'hydroxychloroquine et d'oxygène et avait pu regagner son domicile.

L'examen physique, réalisé aux urgences, montre une tachycardie à 110 BPM ainsi que des râles crépitants plus marqués à la base pulmonaire droite. La biologie montre une élévation des D-dimères (2,29 mg/l), un syndrome inflammatoire (CRP 97 mg/l) ainsi qu'une hyperbilirubinémie (Tableau II) et la gazométrie objective une hypoxémie (59,3 mmHg) (Tableau III).

2.6. Case 6

A 64-year-old man with no significant medical history presented to emergency with dyspnoea associated with a sudden onset of right-sided lower chest pain at home.

The patient had been hospitalised 10 days earlier for hypoxaemic COVID-19 pneumonia. He had improved after treatment with hydroxychloroquine and oxygen and had been discharged.

On exam in the emergency department, he had a tachycardia of 110 BPM and crackles, most notably at the base of the right lung. Laboratory results showed elevated D-dimers (2.29 mg/l), inflammation (CRP 97 mg/l), and hyperbilirubinaemia (Table 2). ABG demonstrated hypoxaemia (59.3 mmHg) (Table 3).

L'angioscanner thoracique montre une embolie pulmonaire bilatérale, entreprenant, de façon proximale, les artères lobaires à droite et les artères segmentaires à gauche.

Chest CT angiogram showed a bilateral pulmonary embolism with the most proximal end reaching the lobar arteries on the right and the segmental arteries on the left.

On note, également, la persistance de plages de verre dépoli périphériques sous-pleurales à prédominance inférieure, à mettre dans le contexte d'une pneumopathie à SARS-CoV-2, dont l'étendue est comparable à l'examen précédent. L'échographie cardiaque transthoracique n'objective pas d'atteinte cardiaque.

We also noticed the persistence of subpleural ground glass opacities in the periphery, most notably at the base of the lungs, consistent with the context of COVID-19. The extent of the ground glass opacities was comparable to previous findings. TTE showed no cardiac involvement.

Le patient est hospitalisé pour oxygénothérapie et traitement anticoagulant. L'évolution est favorable durant l'hospitalisation.

The patient was admitted for oxygen and anticoagulant therapy. He progressed well during admission.

Discussion

L'incidence de l'embolie pulmonaire associée au COVID-19 diverge dans la littérature. Des données récentes semblent montrer que le taux d'incidence d'embolies pulmonaires sévères chez les patients atteints de COVID-19 et hospitalisés aux soins intensifs excéderait 10 % (7). Bien que les causes de l'embolie pulmonaire dans ce contexte ne soient pas encore complétement élucidées, plusieurs étiologies ont été avancées.

3. Discussion

The reported incidence of pulmonary embolism associated with COVID-19 differs in the literature. Recent studies suggest that the incidence rate of severe pulmonary embolism in COVID-19 patients in intensive care will exceed 10% [7]. Although the causes of pulmonary embolism in this context are still not completely clear, many aetiologies have been proposed.

Smeeth et coll. (8) ont démontré une augmentation du risque d'événements thromboemboliques et, notamment, de thrombose veineuse profonde et d'embolie pulmonaire dans les infections aiguës. Un lien entre l'embolie pulmonaire et les pneumonies virales a été évoqué lors des précédentes épidémies de SARS en 2002-2003 (9). Dans une étude in vitro, Visseren et coll. (10) ont rapporté une activité prothrombotique dans des cellules endothéliales infectées par des virus respiratoires.

Smeeth et al. [8] have demonstrated an increased risk of thromboembolic events, especially deep vein thrombosis and pulmonary embolism, in acute infections. The link between pulmonary embolism and viral pneumonia was also suggested in the previous SARS epidemics in 2002-2003 [9]. Visseren et al. [10] reported prothrombotic activity in endothelial cells infected by respiratory viruses in their *in vitro* study.

De plus, l’étude de Gralinski et coll. (11) a démontré, sur modèle animal, que le virus du SARS interagissait avec l’urokinase, provoquant un état d’hypercoagulabilité.

Furthermore, Gralinski et al.'s study [11] demonstrated that the SARS virus interacts with urokinase to induce a hypercoagulable state in an animal model.

L’infection au SARS-CoV-2 pourrait donc favoriser une augmentation du risque thrombotique par le biais du processus inflammatoire lié à l’infection. La sévérité de l’infection pourrait, dès lors, être corrélée avec l’augmentation des D-dimères. Cette observation pourrait signifier que la sévérité de l’infection serait liée, en partie, au développement d’une coagulopathie. Dans une série chinoise (12), 36 % des patients infectés par le SARS-CoV-2 présentaient une augmentation des D-dimères.

Therefore, SARS-CoV-2 infection may increase the risk of thrombosis through the inflammatory response linked to infection. The severity of infection may correlate with an increase in D-dimers, and thus may partly be linked to the development of coagulopathy. A Chinese case series [12] reported that 36% of patients infected with SARS-CoV-2 had elevated D-dimers.

En outre, on note également une augmentation du ratio plasmatique Polynucléaires Neutrophiles/lymphocyte (RNL) chez 4 des 6 patients (Tableau II). L’augmentation du RNL est le reflet d’un processus inflammatoire systémique. Bien qu’il soit utile en tant que facteur pronostique dans les maladies cardiovasculaires et les néoplasies, une augmentation du RNL a aussi été observée chez les patients atteints du COVID19 (13) ainsi que dans les embolies pulmonaires (14).

In our study, we also note an elevated neutrophil-to-lymphocyte ratio (NLR) in 4 of 6 patients (Table 2). An elevated NLR indicates a systemic inflammatory response. While NLR is used to predict the prognosis of cardiovascular disease and neoplasia, an elevated NLR can also be seen in cases of COVID-19 [13] and pulmonary embolism [14].

Dès lors, l’augmentation de la production de neutrophiles associée au processus inflammatoire pourrait également contribuer à l’état prothrombotique, notamment via le relargage d’ADN en extracellulaire, phénomène connu sous le nom de NETose (15).

In fact, the increased production of neutrophils associated with inflammation could also contribute to a prothrombotic state, most notably through the extrusion of DNA in a process called NETosis [15].

Nous rapportons deux cas d'embolie pulmonaire survenus au domicile après hospitalisation. La diminution de l'activité physique due au confinement et l'alitement lors de l'hospitalisation concomitante à l'infection COVID-19 pourraient être des facteurs favorisant la survenue de thrombose veineuse profonde du membre inférieur et d'embolie pulmonaire.

We report two cases of pulmonary embolism that occurred at home after discharge. Decreased physical activity from quarantine and bed rest during admission along with COVID-19 infection are factors that may increase the risk of lower extremity deep vein thrombosis and pulmonary embolism.

Dans notre série, on retrouve chez tous les patients des emboles bilatéraux intéressant aussi bien des branches centrales, segmentaires ou sous-segmentaires des artères pulmonaires. Cette topographie pourrait signifier que le thrombus dériverait d'un autre site comme, par exemple, une thrombose veineuse profonde (TVP). La recherche de TVP par échographie Doppler des membres inferieurs apparaît, dès lors, intéressante chez le patient atteint par le SARS-CoV-2 présentant une augmentation des D-dimères. Malheureusement, dans notre série de cas, aucun patient n'en a bénéficié.

In our case series, all patients had bilateral emboli affecting not only the main branches of the pulmonary arteries, but also the segmental and subsegmental branches. This topography may suggest that the thrombus originated at another site, for example from a deep vein thrombosis (DVT). Therefore, investigation of DVT via Doppler ultrasound of the legs may be indicated in COVID-19 patients with elevated D-dimers. Unfortunately, this test was not performed on any of the patients in our case series.

Toutefois, dans deux séries, Lodigiani et coll. (3) et Helms et coll. (4), la majorité des patients COVID-19 avec une embolie pulmonaire ne présentait pas de TVP associée. Chez Rodríguez et coll. (16), l'incidence de la TVP chez les patients admis pour une pneumopathie COVID19 n'était pas plus grande que dans des séries non COVID-19. L'embolie pulmonaire serait dès lors majoritairement due au processus inflammatoire en cours dans le poumon plutôt que dérivant d'une TVP.

However, in two other case series by Lodigiani et al. [3] and Helms et al. [4], most of the COVID-19 patients that suffered from pulmonary embolism did not have an associated DVT. Rodríguez et al. [16] remarked that the incidence of DVT in patients admitted for COVID-19 was no higher than those without COVID-19. It seems then that pulmonary embolism is more so caused by lung inflammation rather than DVT.

La survenue d'une embolie pulmonaire chez les patients atteints du COVID-19 peut être fatale et constitue un défi pour les cliniciens car les symptômes peuvent être similaires et se confondre avec ceux d'une pneumopathie COVID-19.

Pulmonary embolism in COVID-19 patients can be fatal and is difficult to diagnose given the overlap in symptoms.

Dans notre série, les biologies montraient les anomalies typiquement rencontrées dans les infections à SARS-CoV-2, comme une lymphopénie, une augmentation du taux sérique de ferritine, des lactates déshydrogénases et de la CRP (2). La gazométrie n'était pas contributive. Ceci suggère que l'hypoxémie ne pourrait pas être directement liée à l'embolie pulmonaire mais plutôt au degré de sévérité de l'inflammation pulmonaire.

In this case series, the laboratory results were typical of SARS-CoV-2 infection: lymphopenia, high levels of ferritin, lactate dehydrogenase and CRP [2]. ABG results were non-contributory. This would suggest that hypoxaemia may not be directly linked to pulmonary embolism but to the degree of lung inflammation.

Dans notre série de cas, tous les patients avaient, au scanner thoracique, une pneumopathie COVID-19 mais avec des atteintes inférieures à 25 % du parenchyme pulmonaire. Deux parmi les 6 cas avaient une PCR SARSCoV-2 négative.

Chest CT scans of every patient in this study showed signs of COVID-19, but in each case affecting less than 25% of the lung parenchyma. Two of the six patients tested negative for SARS-CoV-2 via PCR.

Un patient a présenté un arrêt cardiaque sur embolie pulmonaire massive. Les autres cas ne présentaient pas de répercussion cardiaque de leur embolie pulmonaire.

One patient had a cardiac arrest with massive pulmonary embolism. The other patients had no cardiac complications as a result of pulmonary embolism.

A ce jour, certains auteurs (7) proposent, de classer les patients selon leur risque thrombotique comme suit :

- Risque faible : les patients non hospitalisés avec un index de masse corporelle (IMC) < 30 kg/m², sans facteur de risque (FDR) associé.

- Risque intermédiaire : les patients avec IMC < 30 kg/m², avec ou sans FDR associé, sans nécessité d'oxygénothérapie nasale à haut débit (ONHD) ou ventilation artificielle.

- Risque élevé : IMC < 30 kg/m², avec ou sans FDR, sous ONHD ou ventilation artificielle; IMC > 30 kg/m² sans FDR associé; IMC > 30 kg/m2 avec FDR associé, sous ONHD ou ventilation artificielle.

Presently, some authors [7] propose the following classification of patients based on thrombotic risk:

- Low risk: non-hospitalised patients with a body mass index (BMI) <30 kg/m², and no associated risk factors.

- Moderate risk: patients with a BMI <30 kg/m², with or without associated risk factors, and not requiring high-flow nasal cannula (HFNC) oxygen therapy or mechanical ventilation.

- High risk: BMI <30 kg/m², with or without risk factors, and on HFNC or mechanical ventilation; BMI >30 kg/m² without associated risk factors; BMI >30 kg/m² with associated risk factors, and on HFNC or mechanical ventilation.

- Risque très élevé : IMC > 30 kg/m² avec FDR, sous ONHD ou ventilation artificielle.

On recommande de toute manière une anticoagulation prophylactique chez tout patient COVID-19 hospitalisé et ce uniquement durant la durée d'hospitalisation.

Ces mêmes auteurs proposent une dose d'énoxaparine 4.000 UI/24h en sous-cutané (SC) pour les patients à risque intermédiaire, une dose d'énoxaparine de 4.000 UI/12h SC pour les risques élevés et d'utiliser des doses curatives d'énoxaparine, soit 100 UI/kg/12h SC, pour les risques très élevés. En cas d'insuffisance rénale (clairance créatine < 30 ml/min), il est proposé d'administrer de l'héparine non fractionnée (HNF) à une dose de 200 UI/kg/24h pour les risques élevés et 500 UI/kg/24h pour les risques très élevés. Il est également recommandé d'adapter les doses d'énoxaparine pour les patients avec un poids > 120 kg et de doser régulièrement l'activité anti-Xa (7).

Selon les récentes recommandations d'un panel d'experts (17), les nouveaux anticoagulants par voie orale (NOAC) sont une bonne alternative pour les patients ne présentant pas d'interaction médicamenteuse. Pour les patients critiques avec une embolie pulmonaire ou une TVP, on préfère les HBPM ou fondaparinux aux NOAC. La durée de l'anticoagulation doit être de trois mois. En cas de récidive d'événements thromboemboliques sous NOAC, il faudra repasser aux HBPM (17).

- Very high risk: BMI >30 kg/m² with risk factors, and on HFNC or mechanical ventilation.

Overall, we recommend strictly inpatient prophylactic anticoagulation for every patient hospitalised with COVID-19.

The same authors proposed administering a 4000 IU/24h subcutaneous (SC) dose of enoxaparin for moderate risk patients, a 4000 IU/12h SC dose of enoxaparin for high risk, and a curative dose of enoxaparin (100 IU/kg/12h SC) for very high risk. In cases of renal failure (creatinine clearance <30 ml/min), administration of unfractionated heparin (UFH) is recommended at a dose of 200 IU/kg/24h for high risk and 500 IU/kg/24h for very high risk. It is also recommended to adjust the dosage of enoxaparin for patients over 120 kg, as well as based on regular anti-Xa monitoring [7].

Based on recent recommendations from a panel of experts [17], direct oral anticoagulants (DOAC) are a good alternative for patients with no contraindications. For critically ill patients with pulmonary embolism or DVT, LMWH or fondaparinux are preferred over DOAC. The course of anticoagulation must be three months. In case of a recurrent thromboembolic event on DOAC, the patient should be switched to LMWH [17].

Conclusion

La maladie à COVID-19 prédispose probablement aux événements thromboemboliques. Chez les patients atteints du COVID-19, une élévation des D-dimères est fréquente et doit faire suspecter une embolie pulmonaire, d'autant plus si le patient présente cliniquement une dyspnée, des douleurs thoraciques ou une désaturation. Le diagnostic se fait par un angioscanner thoracique ou par scintigraphie pulmonaire ventilation/perfusion quand l'angioscanner est contre-indiqué. Si une embolie pulmonaire est mise en évidence, une anticoagulation doit être débutée. Une anticoagulation prophylactique doit être discutée chez les patients présentant une pneumopathie à SARS-CoV-2.

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4. Conclusion

COVID-19 is a possible risk factor for thromboembolic events. Patients with COVID-19 often have elevated D-dimers, and pulmonary embolism should be suspected especially if the patient presents with dyspnoea, chest pain, or desaturation. Diagnosis should be done by chest CT angiography or V/Q scan when angiography is contraindicated. Anticoagulation must be initiated if pulmonary embolism is detected. Prophylactic anticoagulation should be considered in patients presenting with COVID-19.

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FRENCH ST

Tableau I. Caractéristiques des six patients.

	Cas 1	Cas 2	Cas 3	Cas 4	Cas 5	Cas 6
Âge	58	78	37	40	78	64
IMC (kg/m²)	29,4	33,2	20	32	23	30
PCR SARS-CoV-2	+	+	-	-	+	+
Lésions COVID-19 au scanner thorax	10-25 %	25 %	< 10 %	< 10 %	10-25 %	10-25 %
Emboles bilatéraux au scanner thorax	Oui	Oui	Oui	Oui	Oui	Oui
Répercussion à l'échocardiographie	Non	Non	Non	Non	Oui	Non

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Table 1. Characteristics of the six patients.

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Age	58	78	37	40	78	64
BMI (kg/m²)	29.4	33.2	20	32	23	30
PCR SARS-CoV-2	+	+	-	-	+	+
COVID-19 lesions on chest CT scan	10-25%	25%	<10%	<10%	10-25%	10-25%
Bilateral emboli on chest CT scan	Yes	Yes	Yes	Yes	Yes	Yes
Echocardiographic findings	No	No	No	No	Yes	No

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Tableau II. Biologies des six patients.

	Cas 1	Cas 2	Cas 3	Cas 4	Cas 5	Cas 6		
Hémoglobine	13,8	13,8	15,5	14,4	12,4	14	g/dl	13-17
Globules blancs	15,8	4,5	**11,1**	**11,0**	7,7	**11,1**	x 1.000/ mm^3	4-10
Neutrophiles/mm^3	**12,2**	3,02	**9,60**	8,21	3,82	8,33	x 1.000/ mm^3	2-7,5
Lymphocytes/mm^3	2,07	**1,17**	**0,63**	1,50	3,29	1,62	x 1.000/ mm^3	1,5-4
Ferritine	**450**	**456**	**323**	269	**4.711**	**517**	µg/l	22-322
Plaquettes	311	167	28	192	156	211	x 1.000/ mm^3	150-400
D-Dimères	**1,91**	**1,19**	**5,30**	**6,63**	**25,0**	2,29	mg/l	0-0,5
Urée	31,9	25,0	14,4	27,5	**40,7**	20,1	mg/dl	70-100
Créatinine	0,76	0,73	0,97	0,83	**1,39**	1,05	mg/dl	0,7-1,2
DFG (MDRD2)	> 60	> 60	> 60	> 60	**> 49**	> 60	ml/mi/1,73m²	> 60
Bilirubine totale	0,56	0,63	1,17	0,40	**1,74**	**2,07**	mg/dl	0,3-1,1
Bilirubine directe	0,20	0,27	0,50	0,14	**0,98**	**0,57**	mg/dl	0,1-0,5
GOT (AST)	34	41	41	19	**171**	18	U/l	5-42
GPT (ALT)	**48**	29	35	19	**102**	26	U/l	5-40
CK-Nac total	29	139	186	69	195	49	U/l	30-200
LDH	**246**	382	**258**	**287**	**595**	**238**	U/l	125-220
PAL	112	85	123	69	**179**	126	U/l	40-150
Gamma-GT	**162**	30	52	**70**	**205**	51	U/l	12-64
Cholestérol total	169	**114**	171	**357**	116	175	mg/dl	120-190
Cholestérol HDL	**44**	**40**	73	95	33	**35**	mg/dl	46-180
Cholestérol non-HDL	125	74	98	262	83	140	mg/dl	< 145
CRP	**85**	**78**	**19**	**145**	**91**	**97**	mg/l	< 10
Procalcitonine	< 0,02	0,03	0,02	0,02	0,04	0,05	µg/l	0-0,5
Troponine Ic-hs	0	11	4	1	**37**	4	µg/l	< 30
RNL	5,90	2,58	15,33	5,47	**1,16**	5,14		

GOT (AST) : acide aspartique via l'aspartate aminotransférase; GPT (ALT) : alanine via l'alanine aminotransférase; LDH : lactico-déshydrogénase; PAL : phosphatase alcaline; CRP : protéine C-réactive; RNL : ration plasmatique Polynucléaires Neutrophiles/lymphocytes.

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Table 2. Laboratory results of the six patients

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Units	Reference range
Haemoglobin	13.8	13.8	15.5	14.4	12.4	14	g/dl	13-17
White blood cells	15.8	4.5	**11.1**	**11.0**	7.7	**11.1**	x 1000/mm^3	4-10
Neutrophils/mm^3	**12.2**	3.02	**9.60**	8.21	3.82	8.33	x 1000/mm^3	2-7.5
Lymphocytes/mm^3	2.07	**1.17**	**0.63**	1.50	3.29	1.62	x 1000/mm^3	1.5-4
Ferritin	**450**	**456**	**323**	269	**4.711**	**517**	µg/l	22-322
Platelets	311	167	28	192	156	211	x 1000/mm^3	150-400
D-dimers	**1.91**	**1.19**	**5.30**	**6.63**	**25.0**	2.29	mg/l	0-0.5
Urea	31.9	25.0	14.4	27.5	**40.7**	20.1	mg/dl	70-100
Creatinine	0.76	0.73	0.97	0.83	**1.39**	1.05	mg/dl	0.7-1.2
GFR (MDRD2)	>60	>60	>60	>60	**>49**	>60	ml/min/1.73m^2	>60
Total bilirubin	0.56	0.63	1.17	0.40	**1.74**	**2.07**	mg/dl	0.3-1.1
Direct bilirubin	0.20	0.27	0.50	0.14	**0.98**	**0.57**	mg/dl	0.1-0.5
AST (GOT)	34	41	41	19	**171**	18	U/l	5-42
ALT (GPT)	**48**	29	35	19	**102**	26	U/l	5-40
Total CK-Nac	29	139	186	69	195	49	U/l	30-200
LDH	**246**	382	**258**	**287**	**595**	**238**	U/l	125-220
ALP	112	85	123	69	**179**	126	U/l	40-150
GGT	**162**	30	52	**70**	**205**	51	U/l	12-64
Total cholesterol	169	**114**	171	**357**	116	175	mg/dl	120-190
HDL cholesterol	**44**	**40**	73	95	33	**35**	mg/dl	46-180
Non-HDL cholesterol	125	74	98	262	83	140	mg/dl	<145
CRP	**85**	**78**	**19**	**145**	**91**	**97**	mg/l	<10
Procalcitonin	<0.02	0.03	0.02	0.02	0.04	0.05	µg/l	0-0.5
Troponin I, highly sensitive	0	11	4	1	**37**	4	µg/l	<30
NLR	5.90	2.58	15.33	5.47	**1.16**	5.14		

AST (GOT): aspartic acid via aspartate aminotransferase; ALT (GPT): alanine via alanine aminotransferase; LDH: lactate dehydrogenase; ALP: alkaline phosphatase; CRP: C-reactive protein; NLR: neutrophil-to-lymphocyte ratio.

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Tableau III. Gaz du sang chez les six patients

	Cas 1	Cas 2	Cas 3	Cas 4	Cas 5	Cas 6		
pO2	**73**	**59,9**	80	**70,1**	**141,8**	**59,3**	mmHg	75-100
Saturation O2	95,3	93,1	96,7	95,3	98,1	**92,2**	%	94-100
pH	7,42	7,45	7,47	7,44	**7,06**	7,44		7,28-7,45
pCO2	36,6	41,3	32,2	**29,4**	**68,4**	35,2	mmHg	35-45
Excès de base	- 1,2	**4**	- 0,2	- 3,2	- 11,9	- 0,3	mmol/l	< 3
Bicarbonates	22,9	28,3	22,7	19,6	19	23,4	mmol/l	19-28
CO2 total	24	29,5	23,7	20,5	21,1	24,5	mmol/l	20-36

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Table 3. Arterial blood gas values of the six patients

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Units	Reference range
pO2	**73**	**59.9**	80	**70.1**	**141.8**	**59.3**	mmHg	75-100
O2 saturation	95.3	93.1	96.7	95.3	98.1	**92.2**	%	94-100
pH	7.42	7.45	7.47	7.44	**7.06**	7.44		7.28-7.45
pCO2	36.6	41.3	32.2	**29.4**	**68.4**	35.2	mmHg	35-45
Base excess	-1,2	**4**	-0.2	-3.2	-11.9	-0.3	mmol/l	<3
Bicarbonate	22.9	28.3	22.7	19.6	19	23.4	mmol/l	19-28
CO2 content	24	29.5	23.7	20.5	21.1	24.5	mmol/l	20-36

Introduction

This work consists of a French to English translation of the scientific article entitled *Embolie pulmonaire chez des patients atteints de COVID-19 : à propos de 6 cas* [Six cases of acute pulmonary embolism associated with COVID-19] by Steeman et al. (2020) followed by a detailed commentary.

Firstly, Chapter 1 discusses the characteristics of the source text (ST) and how these were considered when crafting the target text (TT). Next, Chapter 2 outlines the drafting of the TT, including textual and formatting aspects, and an overview of the translation technology that facilitated this process. Chapter 3 focuses on the translation problems encountered and their solutions. Finally, Chapter 4 deals with medical terminology. The aim of this commentary is to highlight the decisions made in this particular translation and in doing so, provide insight and general strategies for translating scientific and medical texts.

1. Source Text Analysis

Before translating, it is important to read and comprehend the ST as well as to identify the characteristic features that will need to be rendered in the TT. In this section, I describe the ST (1.1), the text type (1.2) and genre (1.3), and its target readership (1.4). I also explain why I selected this ST (1.5) and present the hypothetical commission (1.6) I used to guide my translation.

1.1 Description of the source text

The ST is a scientific article published in the *Revue Médicale de Liège,* the medical journal of the University of Liège in Belgium. The paper was written by medical professionals from the university hospital of Ardennes, Belgium, and outlines six cases of acute pulmonary embolism (PE) in COVID-19 patients observed at the hospital. Each case presentation includes a description of symptoms, lab results and radiological findings. As a result, the article features specialised vocabulary pertaining to respirology, immunology, and radiology which will be explored in Chapter 4.

1.2 Text type

According to Reiss (1981:127), "the text type determines the general method of translating". Based on her categorisation, the ST is considered an informative text type as its focus is to convey content without artistic (expressive type) or persuasive (operative type) character. Therefore, when translating the text, the priority is to accurately transfer the information rather than retaining the form or structure (ibid., 130).

1.3 Text genre

While identifying the text type helps guide general translation decisions, the text variety or genre "demands consideration for language and text structure conventions" (ibid., 127). The ST is a case series, which is defined as a "[collection] of similar case reports involving patients who were given similar treatment" (Montalt and Davies, 2014:77). The purpose of a case series is to share relevant clinical information with the medical community, stimulate research on a specific issue, or teach medical students how to deal with particular cases (ibid., 75). Given the informative and educative nature of this genre, the text must be descriptive and easy to follow.

Like other types of scientific articles, case series follow a general structure. The ST is comprised of the following sections: title, abstract, keywords, introduction, description of the six cases, discussion, and conclusion. Depending on the journal of publication, this structure may differ; the structure of the TT will be discussed in Chapter 2.

1.4 Source text target readership

The *Revue Médicale de Liège* publishes articles for "students, general practitioners, and specialists" (Revue Médicale de Liège, n.d.); this is a specialised audience with a background in medicine. Given the subject of the ST, the use of medical terminology without explanations, and the proposal of prophylaxis and treatment plans, it is evident that the text is not written for the lay person.

1.5 Source text selection

As I am writing this dissertation, hundreds of thousands of people are still being infected by COVID-19 every day in the United Kingdom (Lovett, 2022). The novel coronavirus (SARS-CoV-2) has caused lockdowns around the world and has wreaked havoc on public health systems. Several new variants of the virus have been discovered since the beginning of the pandemic and we are still finding out new side effects and consequences of the virus. Dealing with this type of global medical emergency requires the collaboration of scientists from around the world. In fact, to facilitate the dissemination of information on COVID-19, many journals have compiled and provided free access to articles, such as LitCovid by PubMed (<https://www.ncbi.nlm.nih.gov/research/coronavirus/>), Elsevier's Novel Coronavirus Information Center (<https://www.elsevier.com/connect/coronavirus-information-center>), and BMJ's Coronavirus (covid-19) Hub (<https://www.bmj.com/coronavirus>).

Translating the ST into English would give more medical professionals access to the information and help advance COVID-19 research. Furthermore, this case series was the first French article in PubMed to document PE in the context of COVID-19. In addition to providing novel information during a pandemic, this article discusses a potentially fatal sequela of COVID-19 infection that requires immediate treatment and is thus important to be aware of.

Another reason I chose this ST was because of my background in life sciences. I was eager to use my knowledge in the field to produce a professional translation of an article that is relevant to current events. This translation project is an opportunity to explore the nuances of medical translation and further improve my skills in this specialisation.

1.6 Translation commission

A translation commission is a detailed description of what is expected of a translation. Vermeer (2012:200) explains that the *skopos* of a translation, in other words, the goal or purpose, is defined by the commission. As such, I have included all relevant information in the below commission to specify the purpose of translation.

The full ST of 3849 words including figure captions, tables, and references is to be translated from French (Belgium) to English (UK) for hypothetical publication in the journal, *Respiratory Medicine Case Reports* by Elsevier. Since the purpose of translating into English is to reach a wider audience, this journal was chosen as it is the “companion title to the internationally-renowned Respiratory Medicine, [and] is dedicated to publishing case reports” (Elsevier, n.d.). Given that the ST is a case series about respiratory illness, it would be suitable for publication in this journal. The intended readership is an “international audience of respiratory physicians, trainees and researchers in all respiratory subspecialties, as well as clinicians in related fields” (ibid.), which is slightly more specialised than the general medical audience of the ST journal.

Although the title, abstract, and keywords of the ST have already been translated to English, they will be re-translated to fit the requirements of the journal. The choice to re-translate the abstract and keywords will be further discussed in Chapter 2 and 3 respectively. The structure, format, and style of the TT will conform to the journal’s guide for authors (Appendix 1). The manuscript should be ready for electronic submission by 4 PM BST on September 5, 2022.

2. Drafting the target text

There are many factors to consider on a macro level when drafting the TT. Firstly, the manuscript must conform to the journal's in-house style (2.1), which dictates what variety of English you use, as well as the structure and format of the article. The writing style should also align with anglophone norms for scientific discourse (2.2). To conclude this chapter, I discuss some examples of translation technology that facilitate the translation and drafting process (2.3).

2.1 Following the journal's in-house style guide

It is important to follow the journal style guide to increase the chances of the manuscript being accepted by the publisher. I will explain how the specific guidelines of *Respiratory Medicine Case Reports* affected my choice of English variety and the changes I made regarding structure and formatting.

2.1.1 Choice of English variety

The author's guide states that the manuscript can be written in American or British English. Since I am most familiar with Canadian English, I chose to translate into British English as it generally shares the same spelling conventions. Interestingly, in the case of medical terms, Canadian English prefers American spelling (e.g., anemia instead of anaemia). To ensure correct spelling of medical terminology in British English, I referred to the chart of American/British spelling differences in the New Oxford Dictionary for Scientific Writers and Editors (Martin, 2009). I also consulted the Oxford English Dictionary (<https://www.oed.com/>) for any words that I suspected would be spelled differently. For instance, I expected 'lymphopenia' to be analogous to 'oesophagus' or 'oedema', where the 'e' in American English becomes 'oe' in British English, resulting in the following spelling: 'lymphopoenia'. However, this is not the case as 'lymphopenia' is spelled the same in both language varieties. Ultimately, the dictionary was useful when I had any doubts and made sure the spelling of terminology was correct and consistent.

2.1.2 Structure and formatting

The structure and formatting of the TT are explicitly prescribed by the author's guide. In the case of *Respiratory Medicine Case Reports,* the article should include the following sections: title, abstract, keywords, introduction, case presentation, discussion, conclusion, and references. All sections and subsections must be numbered (i.e., 1, 1.1). The ST already follows a similar structure, thus the only change made was adding the title 'Case presentations' and presenting each case in subsections labelled 'Case 1', 'Case 2', etc.

The journal also specifies that keywords must be in American spelling, which was not an issue as none of the keywords had a different spelling in British English. Although not mentioned in the guide, I decided to put the keywords in alphabetical order as this seems to be the norm in many academic journals.

Other formatting requirements include changing the round brackets around the in-text citation numbers for square brackets, providing the authors' full names, indicating author affiliations with superscript lower-case letters instead of numbers in brackets, and presenting references in AMA format.

The most significant change occurred in the abstract as the English version provided by the ST authors surpasses the 100-word limit of the journal guidelines. However, instead of simply re-translating the abstract into a more condensed version, I used the provided English version as a base to write a more concise abstract that would conform to the criteria of a well-written medical abstract in English; I will go into more detail about this in section 2.2.4.

2.2 Research English

Papers published in scientific journals are written in research English (Montalt and Davies, 2014:165). Some common features of this style of writing include hedging (Olohan, 2016:156), grammatical metaphors (ibid., 157), and short sentences with simple grammar (Swales and Feak, 2004:16, in Montalt and Davies, 2014:165). In general, scientific discourse in English is clear and concise, avoiding sophisticated prose and complicated sentence structure. Since English is considered the *lingua franca* of science, articles written in other languages are often translated into English to be published in renowned journals (Olohan, 2016:138). Bennett (2014:171) argues that in modifying a text to conform to anglophone conventions, translators are committing epistemicide, that is erasing the other language's discourse. While this may be a consequence of publishing in English, researchers and medical professionals seem to agree that a universal language of science is more beneficial than detrimental. In Levacic-Burkhardt's survey (2015:102), scientific researchers acknowledged that while different cultures may have different ways of expressing ideas, scientists tend to think in the same way. She posits that the passive voice, so common in scientific discourse, is just the result of scientists presenting information in the least subjective way, devoid of culture and placing the importance on the information rather than the actor. Given the goal of scientific advancement and dissemination of knowledge, it makes sense to standardise the scientific language, which currently happens to be academic English. I translated the ST accordingly, following anglophone conventions in terms of hedging (2.2.1), abstraction (2.2.2), and simple sentence structure (2.2.3).

In addition to these textual features, articles written in English have certain requirements for the different sections (i.e., introduction, discussion, etc.). For instance, what constitutes a good medical abstract in English may not be the same as in French. I will discuss the crafting of the TT abstract in section 2.2.4.

2.2.1 Hedging

According to Olohan (2016:156), hedges "convey the author's reluctance to accept or present a knowledge claim or proposition as absolute or categorical". This is common in scientific discourse as scientists would not establish new findings as fact without further research and consolidation from other researchers. In English, hedging can take the form of modal auxiliaries (e.g., may, could), verbs (e.g., suggest, seem), or adverbs and adjectives (e.g., possibly, probably) (ibid.). Hedging is also present in the French ST, most often as the modal verb *pouvoir* [to be able to] conjugated in the present conditional (i.e., *pourrait* [could]). Verbs like *apparaître* [to appear] and *sembler* [to seem], as well as adverbs like *probablement* [probably] also act as hedging devices. Some examples of rendering French hedging into English are seen in Table 1.

Table 1

Examples of hedging in source and target texts

	Source text	Literal translation	Target text
1	La pneumonie **apparaît** être la plus sérieuse manifestation de l'infection.	Pneumonia appears to be the most serious manifestation of the infection.	… accompanied by pneumonia, which **seems** to be the most serious manifestation of disease.
2	Des données récentes **semblent** montrer que le taux d'incidence d'embolies pulmonaires sévères chez les patients atteints de COVID-19 et hospitalisés aux soins intensifs excéderait 10 %	Recent data seem to show that the incidence rate of severe pulmonary embolism in patients with COVID-19 who are hospitalised in intensive care will exceed 10%	Recent studies **suggest** that the incidence rate of severe pulmonary embolism in COVID-19 patients in intensive care will exceed 10%
3	L'infection au SARS-CoV-2 **pourrait** donc favoriser une augmentation du risque thrombotique par le biais du processus inflammatoire lié à l'infection.	The infection of SARS-CoV-2 could thus favour an increase in thrombotic risk through the bias of the inflammatory process related to infection.	Therefore, SARS-CoV-2 infection **may** increase the risk of thrombosis through the inflammatory response linked to infection.
4	La maladie à COVID-19 prédispose **probablement** aux événements thromboemboliques.	COVID-19 disease probably predisposes to thromboembolic events.	COVID-19 is a **possible** risk factor for thromboembolic events.

While I made sure to retain the hedging in each case, the exact hedging device is not always equivalent. In example 1, the verb *apparaît* [appears] is translated as 'seems', a different verb that conveys a similar degree of uncertainty. As for example 2, *semblent montrer* [seem to show] is reduced to a single verb, 'suggest', which has an equivalent meaning but is more concise. The most common hedging word in the ST is *pourrait,* which can be translated as 'could' or 'may', as in example 3. Finally, in example 4, I decided to turn the verbal phrase 'probably predisposes' into a noun phrase: 'possible risk'. As a result, the original adverb (probably) becomes an adjective (possible). Ultimately, hedging can take many forms, but they all serve the purpose of introducing caution or downplaying a statement. As such, while hedging should be rendered in the TT, a hedge does not need to be translated exactly as it appears in the ST.

2.2.2 Abstraction

Scientific writing in English is generally more abstract due to the use of grammatical metaphor (Olohan 2016:157), which is when one grammatical class is replaced by another (Halliday, 2004:191). In scientific discourse, this usually involves turning a verbal group into a nominal group, in other words, nominalisation. This construction is useful in condensing text and removing the author, thereby placing importance on the scientific findings, and making them more objective (ibid., 129). Another strategy that places the focus on the action rather than the actor is the passive voice. Table 2 outlines several instances where I have rendered the TT more abstract than the ST through the passive voice or grammatical metaphor.

Table 2

Examples of abstraction in the target text

	Source text	Literal translation	Target text
5	… **on retrouve des thrombus** au sein des différentes artères segmentaires des trois lobes à droite ainsi qu'au niveau soussegmentaire du segment postérieur du lobe inférieur gauche.	… we find thrombi in different segmental arteries of the three right lobes as well as at the subsegmental level of the posterior segment of the left lower lobe.	**Thrombi were found** in various segmental arteries in the three right lobes and at the subsegmental level in the left lower lobe posterior segment.
6	A la biologie (Tableau II), **on note** des D-dimères à 6,63 mg/dl	In the biology (Table II), we note D-dimers at 6.63 mg/dl	Laboratory results (Table 2) **indicated** D-dimers at 6.63 mg/l
7	La survenue d'une embolie pulmonaire chez les patients atteints du COVID-19 peut être fatale et constitue un défi pour les cliniciens car les symptômes peuvent être similaires et se confondre avec ceux d'une pneumopathie COVID-19.	The occurrence of pulmonary embolism in patients with COVID-19 can be fatal and is a challenge for clinicians because the symptoms can be similar and can be confused with those of a COVID-19 lung disease.	Pulmonary embolism in COVID-19 patients can be fatal and is difficult to diagnose given the overlap in symptoms.
8	La maladie à COVID-19 **prédispose probablement** aux événements thromboemboliques.	COVID-19 disease probably predisposes to thromboembolic events.	COVID-19 is a **possible risk** factor for thromboembolic events.

The ST makes use of the French impersonal subject pronoun, *on*, to construct sentences in the active voice (see examples 5 and 6). Since this pronoun does not specify the subject, it can be used as an alternative to the passive voice in French. However, there is no equivalent pronoun in English, thus these sentences were transformed into the passive voice in the TT as in 'thrombi were found' instead of 'we found thrombi'. Example 7 features a particularly long sentence in the ST that was shortened by using a grammatical metaphor. The main clause of the ST sentence is that pulmonary embolism in the context of COVID-19 can be fatal and difficult to diagnose. The addition of the second clause after *car* [because] to explain why PE is difficult to diagnose is what makes the sentence long. I replaced the verbal group, *peuvent être similaires…* [can be similar], with a single noun, 'overlap', to shorten the sentence considerably. The same principle applies to example 8 where the verbal group, *COVID-19 prédispose probablement* [COVID-19 probably predisposes], was nominalised into 'COVID-19 is a possible risk'.

2.2.3 Simplification of sentences

As seen in the previous section, the use of grammatical metaphor helps simplify and condense ideas. Other ways of making medical writing more straightforward include omitting superfluous words (Goodman et al., 2014:200), splitting up long sentences, or combining redundant sentences (see Table 3).

Table 3

Examples of simplification in the target text

	Source text	Literal translation	Target text
9	A la biologie (Tableau II), on note des D-dimères à 6,63 mg/dl, une CRP à 145 mg/l ainsi qu'une légère hypoxémie (PaO2 70,1 mmHg) à la gazométrie (Tableau III).	In the biology (Table II), we note D-dimers at 6.63 mg/dl, a CRP at 145 mg/l as well as a mild hypoxaemia (PaO2 70.1 mmHg) on gasometry (Table III).	Laboratory results (Table 2) indicated D-dimers at 6.63 mg/l, and CRP at 145 mg/l. ABG indicated mild hypoxaemia with a PaO2 of 70.1 mmHg (Table 3).
10	La sévérité de l'infection pourrait, dès lors, être corrélée avec l'augmentation des D-dimères. Cette observation pourrait signifier que la sévérité de l'infection serait liée, en partie, au développement d'une coagulopathie.	The severity of infection could since be correlated with the increase of D-dimers. This observation may signify that the severity of infection could be linked, in part, to the development of a coagulopathy.	The severity of infection may correlate with an increase in D-dimers, and thus may partly be linked to the development of coagulopathy.

The source segment in example 9 presents all the patient's laboratory results in a single sentence. I decided to present the standard blood test values (D-dimers and CRP) and blood gas values as two separate sentences, removing the linking phrase, *ainsi que* [as well as]. Making "two simple statements in two short sentences" helps make medical writing clearer (ibid., 25). Furthermore, as seen in similar case series in the target journal, it is common to have strings of unconnected sentences presenting patient data. Authors provide all relevant test values as context for the reader, but they may not all be related, nor will they be used in the authors' main argument. As a result, it is preferred to provide the values as simple clauses without writing formal sentences. This is evident in the following extract from another COVID-19 case series by Giron et al. (2020:3): "She was tachypneic with a respiratory rate in the 30s and hypoxic to 84% on room air. The hypoxia corrected to >92% with 15L NRBM. ABG at admission was 7.47/34/62 (pH/PaCO2/PaO2)". These are three short sentences containing patient data that are not linked with connecting words. The clinicians' observations are presented as they would appear in a patient report, as separate straightforward statements.

In example 10, the ST is establishing the possible correlation between severity of infection, elevated D-dimers, and development of coagulopathy. Instead of linking all these ideas in one simple sentence, there are two sentences: one that links severity of infection to elevated D-dimers, and another to link severity of infection to coagulopathy. I found this construction repetitive and opted to group all the clauses together with the connector 'thus', resulting in the following: "The severity of infection may correlate with an increase in D-dimers, and thus may partly be linked to the development of coagulopathy".

2.2.4 Writing a medical abstract in English

The abstract is a crucial part of a scientific article as it summarises the main findings and attracts readers to read the full article (Olohan, 2016:159). Nevertheless, abstracts in English may not always be well written, especially when they are translated to accompany an article written in another language (Linder, 2014:20). Mistakes in the abstract can detract from the value of an article, thus it is best to have it professionally translated. This is one of the reasons I decided to re-translate the English abstract (Appendix 2) provided by the ST authors. The following extract features errors such as incorrect word usage and collocations:

> Moreover, there is an overlap between signs and symptoms of pulmonary embolism and COVID-19, which brings a challenge for the diagnosis and could potentially be fatal. Nevertheless, the incidence rate of pulmonary embolism in cases of COVID-19 is currently not known.

Firstly, 'which brings a challenge' is an incorrect collocation as the verb 'bring' is not generally used in this expression. This would be better rendered as 'which constitutes a challenge' or 'which presents a challenge', which is what I chose in my translation. The use of 'nevertheless' is also erroneous as it is a contrasting word meaning 'despite'. However, there is no such contrastive relationship between the preceding clause (the overlapping signs and symptoms being a diagnostic challenge) and the proceeding clause (the incidence of PE being unknown). Instead, the authors mean that despite the purported correlation between PE and COVID-19, the incidence of this is not yet known.

In addition to syntactic errors, the original English translation surpasses the 100-word limit of the target journal. Ultimately, I decided to write a new abstract based on the French and English versions in the ST. I used Salager-Meyer's (1990:370) guidelines for writing an abstract in medical English; a well written abstract should state the following four moves: purpose and methods (sometimes combined into one move), results, and conclusion. The first four sentences of my abstract explain the background and purpose of the paper followed by one sentence that outlines the results, which is just the case presentation. The concluding sentence summarises the clinical suggestions drawn from the six cases.

Finally, I consulted parallel texts in the target journal to see the length and structure of their abstracts. In general, they consisted of a simple summary of findings and were relatively short; one abstract was only two sentences long (Hassan et al., 2020).

2.3 Translation technology

Electronic resources such as term bases and scientific databases are useful sources of information for medical and scientific translators (2.3.1). It is also common for translators to use computer-assisted translation (CAT) tools like translation memory (2.3.2) to aid in the translation process.

2.3.1 Resources

During translation, I used a variety of electronic resources to research terminology and craft the TT. Firstly, to understand the ST, it was helpful to look up unknown terms in dictionaries and term bases. For general words, I mostly used Word Reference (<https://www.wordreference.com/>). For specialised terminology, I consulted the Interactive Terminology for Europe or IATE (<https://iate.europa.eu/home>) and the French-English medical dictionary by the *Académie Nationale de Médecine* [National Academy of Medicine] (<http://dictionnaire.academie-medecine.fr/>). While useful for general medical terms, these resources lack information on more specialised fields, namely radiology in the case of the ST. For these terms, I resorted to monolingual reference pages like Radiopaedia (<https://radiopaedia.org/>), which contains entries written by medical professionals that explain radiology concepts such as ground glass opacities. I also found scientific articles both in English and French to be useful for comprehension of the ST and finding equivalent terms in the target language (TL). For example, I used Kandathil and Chamarthy's (2018) paper on pulmonary vascular anatomy to understand the radiological findings in the case presentations, as well as to see how to refer to the blood vessels in English. Regrettably, medical translation students tend to rely on bilingual dictionaries or online translation services for their research, with few consulting scientific articles (Popineau, 2016:89). Reading articles solved many issues I had with unknown terminology (further discussed in Chapter 4) and should be a main source of information when translating scientific texts. PubMed (<https://pubmed.ncbi.nlm.nih.gov/>) is a great resource for biomedical literature, but I also found pertinent articles by searching for the desired subject on Google Scholar (<https://scholar.google.com/>).

2.3.2 Translation memory

Translation memory (TM) is a CAT tool that stores previously translated segments and matches them with segments in the ST. In theory, this means that translators would not have to translate the same segment twice. I used SDL Trados Studio 2021 for my translation, but since I did not have an existing translation memory, I still translated most segments from scratch. Trados was most helpful for internal repetitions and repeated terms which would show up in the autosuggest window as I started typing. One such repetition was *l'évolution est favorable durant l'hospitalisation* [progression was favourable during hospitalisation], which concluded every case presentation and was consistently translated as 'he/she progressed well during admission'. Overall, the TM was useful for translating the 319 internal repetitions in the ST (see Figure 1).

File Details

File	Type	Segments	Words	Characters	Percent	Recognized Tokens	Repaired words	Fragment words (whole TU)	Fragment words (TU fragment)	AdaptiveMT Impact	Tags
Dissertation source text.docx.sdlxliff	**PerfectMatch**	0	0	0	0.00%	0	0	0	0		0
Chars/Word:5.49	**Context Match**	0	0	0	0.00%	0	0	0	0		0
	Repetitions	319	426	1552	10.65%	332	0	0	0		6
	Cross-file Repetitions	0	0	0	0.00%	0	0	0	0		0
	100%	0	0	0	0.00%	0	0	0	0		0
	95% - 99%	0	0	0	0.00%	0	0	0	0		0
	85% - 94%	0	0	0	0.00%	0	0	0	0		0
	75% - 84%	0	0	0	0.00%	0	0	0	0		0
	50% - 74%	0	0	0	0.00%	0	0	0	0		0
	New/AT	269	3574	20419	89.35%	378	0	0	0		8
	AdaptiveMT Baseline	0	0	0	0.00%	0	0	0	0		0
	AdaptiveMT with Learnings	0	0	0	0.00%	0	0	0	0	0.00%	0
	Total	**588**	**4000**	**21971**	**100%**	**710**	**0**	**0**	**0**	**0.00%**	**14**

Figure 1. Analysis of the source text in SDL Trados Studio 2021

In terms of drawbacks, Trados had trouble segmenting the ST when uploaded in the original PDF format. Sentences were cut off in odd places and random letters became capitalised. As a result, I had to copy the text into a Word document before uploading it to Trados Studio. This meant that the original formatting was lost and had to be fixed manually in the exported TT document. Finally, the segmental approach of the TM tool was not effective for translating the abstract as I had decided to re-write the section rather than translating it strictly from the ST. Therefore, I merged all the source segments of the abstract and wrote the English version in the corresponding target segment. Despite the technical issues, I still found Trados Studio helped me translate more efficiently overall.

3. Translation Problems and Solutions

In this chapter, I outline certain problems I encountered during translation and explain how I solved them. First, I discuss issues caused by ST inaccuracies and inconsistencies (3.1), followed by the difficulties of translating numerical information (3.2). Lastly, I look at problems at the linguistic level (3.3), namely syntactic and lexical differences between the two languages.

3.1 Source text inaccuracies and inconsistencies

Montalt and Davies (2014:22) remark that medical texts may be of poor quality because medical authors are not usually professional writers. This was evident in the ST in the form of inaccuracies, inconsistencies, and ambiguity in the data presented in tables.

3.1.1 Inaccuracies

Firstly, the ST had minor spelling errors resulting from the omission of accents (e.g., *inferieur/inférieur* [inferior], *a l'admission/à l'admission* [on admission]). Although these were minor enough to not impede comprehension of the text, a missing accent can completely change the meaning of a word in French, and translators should be wary of these mistakes. A more serious mistake was found in the English translation of the keywords in which the authors mistranslated *thrombose veineuse profonde* [deep vein thrombosis] as venous thromboembolism. This is the reason I included the keywords in the commission to be re-translated.

Finally, the authors mention *clairance de créatine* [creatine clearance] as an indicator of renal function. When researching this term, a simple Google search showed that the correct term was clairance *de créatinine* [creatinine clearance]. Further research, including a medical review article (Nankivell, 2001:15), confirmed that the ST authors mistakenly wrote 'creatine' instead of 'creatinine'. This demonstrates the importance of terminology research and reminds translators that they should be critical of the ST.

3.1.2 Inconsistencies

Despite it being the main subject of the article, the authors could not decide on the grammatical gender of the noun COVID-19. The first time it is mentioned as *la COVID-19* (feminine) but is subsequently referred to as *au COVID-19* or *du COVID-19*, *au* and *du* being masculine inflections of the prepositions 'to' and 'of' respectively. There is also inconsistency with the acronym SARS-CoV-2, which also appears in the article as SARS-Cov-2 (with a lowercase V). This could be confusing for the translator who must choose the correct spelling in the TL, which in this case is the first spelling (with an uppercase V).

Furthermore, there is a discrepancy in the unit of measurement for D-dimer results presented in the text and in Table 2. In Cases 3 and 4, D-dimers are mentioned in mg/dl instead of mg/l as in Table 2 and the rest of the cases. I assumed the authors used the wrong units and changed both instances to mg/l in the TT. However, it is also possible that these two patients had their D-dimers measured differently and the authors failed to indicate this in the table. Ultimately, this is a case where the translator should consult with the client to make sure the correct units are used in the TT.

3.1.3 Ambiguity

In addition to the varying D-dimer units, Tables 2 and 3 contain some ambiguous information. Both tables have certain values bolded, but the table captions do not explain the significance of these values. At first, I thought the values were bolded if they were outside of the reference range, but this was not the case. For example, all patients had D-dimers exceeding the normal limit of 0.5 mg/l, but the value of 2.29 in Case 6 remained un-bolded while the rest were in bold. I kept the numbers bold in the TT but would confirm this decision with the client before submitting the manuscript for publication. Furthermore, the last two columns of the tables do not have headings. Based on the information, I added the heading 'units' and 'reference range' in the TT. Rather than letting the reader infer the meaning of the two columns, I thought it would be clearer to explicitly state what is being represented; non-obligatory explicitation is a common feature of translated texts (Munday, 2016:92).

3.2 Translating numerical information

While translating numbers would seem simpler than translating textual information, it is easy to overlook the differences of number formatting in different languages. In fact, Mailhac (1993:137) noted that his English to French translation students committed the most errors in translating numerical information than any other text type. In French, the decimal point is a comma, and the thousands separator is a space or a dot. Therefore, 0,02 becomes 0.02, and 1.000 becomes 1000 or 1,000 in English.

The most difficult translation decision regarding numerical information was whether to change the units in Tables 2 and 3. Firstly, the journal's guide for authors says to use the international system of units (SI). However, these are not the conventional units used by medical professionals as per the MSD Manual (Padilla and Abadie, 2021) and are not used even in some articles published in the target journal, e.g., (Hassan et al., 2020; Ishiguro et al., 2020). MSD Manual (2021) also states that "a patient's blood test values should be interpreted based on the reference value of the laboratory in which the test was done". Additionally, Mailhac (1993:152) advises not to automatically change units to SI units and to consult parallel texts to see what is usually done in a particular context. Given the above information and the fact that all the laboratory results were in conventional units, I decided to keep the units unchanged in the TT.

3.3 Linguistic changes

During translation, several changes were made on the syntactic and lexical level.

3.3.1 Syntax

Analysing parallel texts, especially in the *Respiratory Medicine Case Reports* journal, helped me get an idea of what grammatical structures are generally used in case series. I concluded that case series in English tend to present findings in the past tense rather than the present tense as seen in the following ST excerpt:

> A l'admission, elle est pâle, apyrétique et présente une douleur aiguë basithoracique droite irradiant dans l'hypochondre et le flanc droit.
>
> [On admission, she is pale, apyretic and presents an acute pain at the base of the thorax on the right side, radiating to the hypochondrium and the right flank.]

In the TT, this sentence becomes: "On admission, she was pale, afebrile, and was complaining of acute right-sided lower chest pain radiating to the right hypochondrium and right flank".

3.3.2 Lexicon

In comparison to English, French scientific discourse "appears very sensitive to the question of language reuse. Lexical variation is more pronounced and reuse is lower" (Hamilton and Carter-Thomas, 2017:30). The ST demonstrates lexical variation in the different verbs used to present clinical observations (see Table 4).

Table 4

Examples of lexical variation in the source text

	Source text	Literal translation	Target text
11	La biologie **montre** un syndrome inflammatoire…	The biology shows an inflammatory syndrome…	Laboratory results **showed** signs of inflammation…
12	Sur le scanner thoracique, **on note** également la présence d'un infarctus pulmonaire…	On the thoracic scan, we note equally the presence of a pulmonary infarction…	Chest CT scan also **showed** a peripheral pulmonary infarction…
13	L'échographie cardiaque transthoracique ne **révèle** pas de signe de cœur pulmonaire droit aigu.	The transthoracic echocardiogram does not reveal signs of acute right-sided heart failure.	Transthoracic echocardiogram (TTE) did not **show** signs of acute right-sided heart failure.
14	Scanner thoracique **mettant en évidence**, en fenêtre pulmonaire, la présence de multiples infiltrats en verre dépoli de topographie bilatérale.	Thoracic scan putting in evidence, in lung window, the presence of multiple ground glass infiltrates of bilateral topography.	Lung window of chest CT scan **showing** multiple bilateral ground glass opacities.

The four ways of introducing findings in French all translate to the verb ‘to show’ in English. Using the same verb instead of introducing lexical variation makes the TT simpler and easier to read. This idea can be extended to the repetition of the standard term, COVID-19, in the TT. While the ST does refer to the disease most often as COVID-19, it also uses alternate terms to avoid being repetitive. These include *pneumopathie à SARS-CoV-2* and *pneumopathie à COVID-19,* meaning pneumopathy/lung disease caused by SARS-CoV-2 or COVID-19. This is convoluted because the lung disease caused by SARS-CoV-2 is precisely COVID-19. The ST also mentions *maladie à COVID-19* [COVID-19 disease], which is redundant as the ‘D’ in the acronym already stands for ‘disease’. To avoid confusion, I simply translated all these variations as COVID-19. Interestingly, the ST authors made the same decision in their translation of the abstract (i.e., *pneumopathie à SARS-CoV-2* becomes COVID-19 in the English version).

As Goodman et al. (2014:25) outline in their guide for clearer medical writing, repeating the same word can be more effective than using a synonym. Therefore, I opted to repeat simple verbs like ‘to show’ instead of using a variety of expressions, and I kept the term COVID-19 consistent so that readers would know immediately that the authors were referring to the same disease every time. Overall, the lexical simplicity makes the TT clearer than the ST, and consequently easier to understand.

4. Medical Terminology

The greatest challenge in translating this ST was accurately rendering medical terminology from French to English. Terminological variation stemming from linguistic and cultural differences (4.1), and synonymy (4.2) make it difficult to choose the right equivalent term in the TL. Medical abbreviations (4.3) are also a source of confusion, especially if they are not explained in the ST. To further complicate the situation, preferred terminology changes as science progresses, and translators must be sure to use the most up to date terms (4.4). Finally, translators may have trouble finding any equivalent terms at all as the translation of highly specialised terms (4.5) is not always readily available.

4.1 Linguistic and cultural differences

It goes without saying that different languages and cultures have different ways of expressing ideas. As a result, certain medical concepts exist in one language but not the other, or the languages have different ways of describing the same concept. Table 5 shows some examples of how terms vary between French and English.

Table 5

Examples of term variation in French and English

	Source text	Literal translation	Target text
15	La biologie montre un **syndrome inflammatoire** (Tableau II) et une élévation des D-dimères (1,91 mg/l).	The biology shows an inflammatory syndrome (Table II) and an elevation in D-dimers (1.91 mg/l)	Laboratory results showed **signs of inflammation** (Table 2) and an increase in D-dimers (1.91 mg/l).
16	Ses antécédents notables sont une **hypothyroïdie substituée** et une hypertension artérielle traitée par inhibiteur de l'enzyme de conversion de l'angiotensine.	Her notable medical history is substituted hypothyroidism and arterial hypertension treated with an angiotensin-converting enzyme inhibitor.	Her relevant medical history included **hypothyroidism treated with hormone replacement therapy** and high blood pressure treated with angiotensin-converting enzyme (ACE) inhibitors.
17	On recommande de toute manière une anticoagulation prophylactique chez tout patient COVID-19 hospitalisé et ce uniquement durant la **durée d'hospitalisation.**	We recommend, in any case, a prophylactic anticoagulation in any hospitalised COVID-19 patient and only during the duration of hospitalisation.	Overall, we recommend strictly **inpatient** prophylactic anticoagulation for every patient hospitalised with COVID-19.

In French, a *syndrome inflammatoire*, literally 'inflammatory syndrome' (example 15) refers to a set of symptoms indicating the presence of inflammation and is usually diagnosed through a blood test (Larousse, n.d.). In English, the expression 'signs of inflammation' encompasses this definition, whereas 'inflammatory syndrome' suggests a much more serious condition (ICD-11 for Mortality and Morbidity Statistics, n.d.).

In example 16, there is no English equivalent to the French term *hypothyroïdie substituée,* meaning hypothyroidism that is being treated with thyroid hormone replacement. In English, 'substituted' or 'replaced hypothyroidism' does not convey the same meaning, thus this must be explicated as "hypothyroidism treated with hormone replacement therapy" in the TT.

Example 17 shows the opposite where the single English word 'inpatient' can convey the idea detailed in the ST. Medical prescriptions can change at every stage of hospitalisation: pre-admission (before hospitalisation), inpatient (during hospitalisation), and discharge (when the patient leaves the hospital) (Cua and Kripalani, 2008:138). The ST authors specify that prophylactic anticoagulation must only be administered *durant la durée d'hospitalisation* [during hospitalisation] because "temporary medications intended only for the inpatient stay may inadvertently remain on the medication list at discharge" (ibid., 137). As seen in this English scientific article, the term 'inpatient stay' is used to describe the same prescribing period outlined by the ST. To confirm my translation decision, I found another parallel text that used the exact term of 'inpatient prophylactic anticoagulation' (Nutescu et al., 2013:714).

4.1.1 Register change

The preference for lay terms in English scientific discourse compared to the technical terms used in French (van Hoof, 1998:60) is a specific example of cultural difference. Unlike French, English has a "double-layered medical vocabulary – that is, most scientific words have popular counterparts" (Montalt and Davies, 2014:242). Table 6 shows French medical terms found in the ST and their equivalent English doublets.

Table 6

Examples of double-layered medical vocabulary in English

French term	English technical term	English popular term
Pyrexie	Pyrexia	Fever
Dyspnée	Dyspnoea	Shortness of breath
Myalgie	Myalgia	Muscle pain
Céphalée	Cephalalgia	Headache
Hémoptysie	Haemoptysis	Coughing up blood

In the TT, I used the popular terms, 'fever' and 'headache', but kept the technical terms, 'dyspnoea', 'myalgia', and 'haemoptysis'. Since these symptoms are usually listed one after the other in the text, it is easier to use single-word nouns. For instance, the sentence: "patients may also have diarrhoea, headaches, sputum and haemoptysis" flows better than "patients may also have diarrhoea, headaches, sputum, and may cough up blood". The other reason is that unlike 'pyrexia' and 'cephalalgia', these three technical terms are more commonly used (see Ishiguro et al., 2020:6).

4.2 Synonymy

The foundation of both English and French medical terminology is based on Greek and Latin roots. Synonymy can arise when terms derived from Greek are used concurrently with terms derived from Latin. In the ST, the term *apyrétique* is of Greek origin and can be translated as 'apyretic' in English. However, the Latin-derived term 'afebrile' also exists and is more common (Oxford English Dictionary, n.d.). This is an example of a root switch where the Latin form substitutes the Greek form in English (van Hoof, 1998:52).

Similar to the popular English terms described in the previous section, diseases can often have a simpler descriptive term in addition to their classically derived name (Buysschaert, 2021:66). For example, the French term, *coeur pulmonaire,* can be translated as 'cor pulmonale', which comes from Latin, or as the descriptive term 'right-sided heart failure'. I chose the latter in my translation as the self-explanatory nature (ibid.) of the term lends to the clarity and simplicity preferred in English scientific discourse. In the same vein, I translated *scintigraphie pulmonaire ventilation/perfusion* as 'V/Q scan'. In English, this diagnostic test can be referred to as lung scintigraphy, ventilation-perfusion scan, or V/Q scan. The more technical 'scintigraphy' is replaced with the vernacular word 'scan' and further reduced to V/Q scan, where 'V' stands for ventilation and 'Q' for perfusion (Mirza and Hashmi, 2021). The tendency to use abbreviations in medical English will be discussed in the next section.

4.3 Abbreviations

Abbreviations are commonly used in medical language and are one of the hardest lexical features to translate (Kasprowicz, 2010:1). In some cases, the abbreviation is more common than the full form, as in CPR for 'cardiopulmonary resuscitation' (Buysschaert, 2021:67), which is why I translated *résuscitation cardiaque* [cardiac resuscitation] in the ST as 'CPR'. Given the popularity of abbreviations in medical English, I included abbreviations in the TT even when they do not appear in the ST. For instance, I use TTE throughout instead of repeating the full form 'transthoracic echocardiogram' like the ST does with *échographie cardiaque transthoracique.* In the case of *inhibiteur de l'enzyme de conversion de l'angiotensine,* I include the full name 'angiotensin-converting enzyme inhibitor' in the TT, but also add 'ACE' in brackets as this drug is more commonly known as 'ACE inhibitor'.

Table 2 in the ST is the most abundant source of abbreviations. Luckily, most of them have similar equivalents in English and were easily found in MSD's blood test reference values chart (Padilla and Abadie, 2021). In fact, many abbreviations remained unchanged as French often adopts

English abbreviations (van Hoof, 1998:59), e.g., CRP for C-reactive protein, and HDL for high-density lipoprotein.

I had the most trouble with the abbreviation *RNL* as I could not find it in any term base. I searched the full ST term *ration plasmatique Polynucléaires Neutrophiles/lymphocytes* [plasma ratio of polynucleated neutrophils/lymphocytes] to find French articles that define the term. Firstly, I noticed that the word *ration* was misspelt (it should be *ratio),* and many of the search results appeared without *plasmatique and polynucléaires.* Consequently, I removed these two words and searched the English literal translation, 'neutrophil/lymphocyte ratio'. I compared French (Lemaitre et al., 2017) and English (Ma et al., 2016) scientific articles to make sure that the terms were used in the same context and concluded that the English equivalent was simply 'NLR' (neutrophil/lymphocyte ratio). The word *plasmatique* to specify that the ratio is calculated from cells in the plasma is omitted in the English term. Additionally, English prefers the simple name, 'neutrophil', while the French ST opts for the full name, *polynucléaire neutrophile* [polymorphonuclear neutrophil]. Neither *plasmatique* nor *polynucléaires* are included in the abbreviation (*RLN),* which adds to the difficulty of finding the equivalent in the TL.

Lastly, I made a small change to the term pairs: *GOT (AST)* and *GPT (ALT).* GOT and GPT stand for 'glutamic oxaloacetic transaminase' and 'glutamic pyruvic transaminase' respectively, while AST and ALT stand for 'aspartate aminotransferase' and 'alanine aminotransferase'. Since the abbreviations are based off the English names of these enzymes, they stay the same in the TT. However, I changed which terms were written in brackets: AST (GOT) and ALT (GPT). This is because GOT and GPT are the former names for AST and ALT, which are now preferred (Huang et al., 2006:756). This is a subtle but meaningful change as a scientific paper should strive to provide the most up to date information.

4.4 Diachronic variation

Terminology is constantly being updated as scientific research progresses, which means terms are superseded with new terms, leading to diachronic variation (Buysschaert, 2021:69). When looking for the English equivalent of *infiltrats en verre dépoli* [ground glass infiltrates], I found the terms 'ground glass opacifications' and 'ground glass opacities' on Radiopaedia (Shivananda and Amini, 2008). This reference page also warns against the use of the word 'infiltrate' as it is non-specific and imprecise. In the end, I opted for 'ground glass opacities' as it is slightly more concise than its alternative. Several term variations also exist for the translation of *défaillance multiorganique* [multiorgan failure]. According to Varon and Marik (2008:1870), "this syndrome has been called multisystem organ failure (MSOF), multiple organ system failure (MOSF), and more recently multiorgan dysfunction syndrome (MODS)", which is the term I use in the TT.

Terms can also change as a result of new normalisation efforts (Buysschaert, 2021:69). For example, *râles crépitants* can technically be translated as 'crepitations', 'crackles', or 'rales'. However, 'rales' has been superseded by 'crackles', and while 'crepitations' is still used in many European languages, it is typically only used to refer specifically to fine crackles in English

(Pasterkamp et al., 2016:728). Therefore, I used the most standard term, 'crackles', in my translation.

Diachronic variation can also be seen in abbreviations such as NOAC (novel oral anticoagulants) and DOAC (direct oral anticoagulants), both referring to the same class of drugs. The ST uses the English abbreviation 'NOAC' alongside the full French term, *nouveaux anticoagulants par voie orale.* Since these anticoagulants are no longer considered novel and the abbreviation 'NOAC' can arguably be misinterpreted as 'no anticoagulants', DOAC has become the recommended abbreviation (Barnes et al., 2015:1155). In fact, the English paper that the ST references upon mention of these anticoagulants uses DOAC instead of NOAC (Moores et al., 2020:1144); perhaps NOAC is the preferred abbreviation in French, thus prompting the ST authors to make this change. As for the TT, I decided to switch the abbreviation back to DOAC as suggested by Barnes et al.

4.5 Specialised terms and nuances

Terms used when discussing specialised fields of medicine can be difficult to translate due to their specificity. The ST has several terms in the fields of radiology, respirology, and immunology that I could not find in online bilingual dictionaries and term bases (mentioned in Chapter 2). Buysschaert (2021:73) remarks that medical translators dealing with communication in these subdisciplines must "develop their own termbases with abbreviations, their explanations and equivalents in the target language". The following are some specific terms in the ST along with their explanations and English equivalents.

Plages de pneumopathie: Similar to *plages à verre dépoli* [ground glass opacities], I understood this to be a type of CT scan finding. Upon looking up *pneumopathie* [pneumopathy], I found that this referred to inflammation of the lung parenchyma in the bronchioles or alveoli, usually associated with cellular infiltration or oedema (Académie Nationale de Médecine, n.d.). I searched Radiopaedia for a radiological finding that corresponded with this description and found the term 'consolidation', which "refers to the alveolar airspaces being filled with fluid (exudate/transudate/blood), cells (inflammatory), tissue, or other material" (Murphy and Hacking, 2019). Since this matched with the definition of *pneumopathie,* I tried to find scientific articles that mentioned 'consolidation' and landed on a paper talking about 'pulmonary consolidations' in COVID-19 (Bhatt et al., 2021). Given the use of this term in a similar context as the ST, I settled on 'pulmonary consolidation' as the English equivalent of *plages de pneumopathie'.*

Condensations pneumoniques: This is another radiological term that had no entries in the dictionaries or term bases I consulted. Instead, I found a scientific paper that mentioned this term and had its title and abstract both in English and French (Delouche et al., 2016:151). From this bilingual parallel text, I was able to identify the English equivalent as 'lung congestion', which, in medical imaging, refers to homogeneous increased density in the vessels and bronchial walls (ibid.).

Oxygénothérapie nasale à haut débit (ONHD): A strategy for specialised terms is to search their literal translation on the internet and see if this yields any useful resources. In this case, I roughly translated the French term as ‘high-flow oxygen therapy’ and searched this on Google. Several scientific articles came up with the term ‘high-flow nasal cannula (HFNC) oxygen therapy’, which consists of heated and humidified oxygen administered at a flow rate of up to 60 litres per minute (Sharma et al., 2022). Comparing this with the definition of the French term, I was able to confirm HFNC as the English equivalent.

Angioscanner thoracique: The English translation of *angioscanner* in the dictionary of the *Académie Nationale de Médecine* is ‘angioscan’. However, a Google search of this word only returns 28,800 hits, many of them in French. In English, both ‘CT angiogram’ and ‘CT angiography’ are commonly used; the first term refers to the individual test or the resulting image/scan, while the second refers to the radiological technique (Oxford English Dictionary, n.d.). This nuance does not exist in the ST as the term *angioscanner thoracique* encompasses both definitions; this is an example of polysemy (see Table 7).

Table 7

Translation of ‘angioscanner thoracique’: chest CT angiogram vs. chest CT angiography

	Source text	Literal translation	Target text
18	Devant l’augmentation des D-dimères, le bilan est complété par un **angioscanner thoracique** qui révèle la présence d’une embolie pulmonaire bilatérale à prédominance droite	Due to the increase in D-dimers, the check-up is completed by a thoracic angiogram that reveals the presence of a bilateral pulmonary embolism with right-side predominance	Given the elevated D-dimers, a **chest CT angiogram** was ordered and revealed a bilateral pulmonary embolism primarily affecting the right side.
19	Le diagnostic se fait par un **angioscanner thoracique** ou par scintigraphie pulmonaire ventilation/perfusion quand l’**angioscanner** est contre-indiqué.	The diagnosis is done by a thoracic angiogram or pulmonary ventilation/prefusion scintigraphy when the angiogram is contraindicated.	Diagnosis should be done by **chest CT angiography** or V/Q scan when **angiography** is contraindicated.

Example 18 is from the first case presentation and describes the findings of the patient’s CT angiogram. Since the ST is describing an individual test, the term ‘angiogram’ is used. However, example 19 is referring to the overall technique of angiography used to diagnose pulmonary embolism. This is especially true for the latter half of the sentence: ‘when angiography is contraindicated’. It is possible to say, ‘when an angiogram is contraindicated’, but in using ‘angiography’ instead, the indefinite article ‘an’ is not needed. Understanding this term variation gives the translator more options when constructing sentences and helps convey a more nuanced meaning.

Conclusion

There are many steps involved in producing a high-quality medical translation.

To translate this case series, I first analysed the ST and determined the goal and purpose of the translation: to produce an equivalent English article for publication in an academic journal. Medical texts come in many genres (e.g., journal articles, patient fact sheets, etc.), each destined for a different readership with varying medical knowledge (e.g., researchers, patients, medical students). Therefore, it is important to first identify the genre and target audience to have a general sense of direction for the translation.

Next, I started drafting the TT in accordance with the journal’s in-house style guidelines. In addition to changing the structure and format, I made sure to follow anglophone scientific discourse conventions so that the TT is more likely to be accepted by the publisher. In general, medical writing should be simple and straightforward. To facilitate the translation process, I used translation technology and online resources.

During translation, I encountered problems at the linguistic level and had to deal with ST errors and numerical information. Scientific and medical texts often include numerical data that should be rendered carefully, rather than simply copied and pasted into the TT.

Finally, it is evident that translating specialised medical terminology requires multiple resources. In addition to term bases and dictionaries, monolingual and bilingual parallel texts, reference books, and websites are useful sources of information. In the case of translating a scientific article, the list of references is especially helpful for finding equivalent terms in the TL, most notably if English is the TL as most references will be in English given its status as *lingua franca.* These strategies for dealing with terminology can be applied to any scientific or medical translation.

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