Med Ultrason 2022, Vol. 24, no. 1, 120-128

Ultrasonographic diagnosis and guided treatment of erector spinae aponeurosis enthesopathy

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To the Editor,

A 36-year-old female visited our outpatient clinic with chronic low back pain for 7 months. Her pain was mostly localized at the right lumbosacral area with occasional referred pain at right gluteal region and was aggravated by postural changes, particularly when bending and standing up after prolonged sitting. She had no known systemic diseases or trauma history. Physical examination demonstrated local tenderness on the right posterior superior iliac spine (PSIS) and erector spine muscle (ESM) without limitation of lumbar range of motion. No sensory deficit or focal weakness was found. Radiographs of the lumbar spine were unremarkable.

Ultrasonography (US) revealed marked swollen and hypoechoic erector spinae aponeurosis (ESA) at the enthesis near right PSIS, with a small linear calcification and regional hetero-echogenicity, corresponding to the most tender area (fig 1). Under the impression of ESA enthesopathy, US-guided injection with 1 ml 50% dextrose and 1.5 ml 1% Xylocaine at right ESA enthesis was performed. The patient reported a significant pain reduction in posture changes immediately post-injection (50%) and 2 weeks after the 1st injection (more than 80%). Therefore, a series of 3 injections at 3 to 4-week interval was arranged and the patient reported complete resolution of symptoms subsequently.

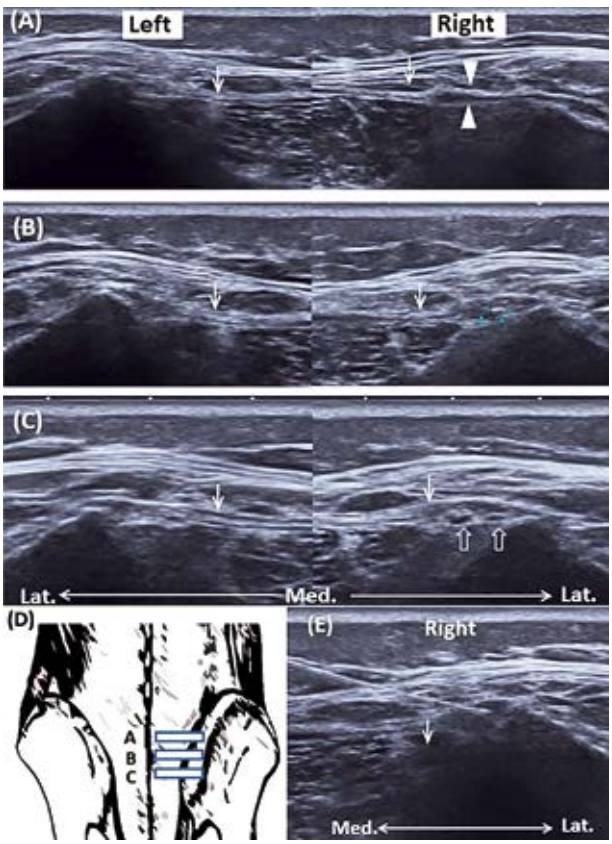

Fig 1. Axial views of ESA (arrows) of left (asymptomatic) and right (symptomatic) sides. Focal hypoechoic and swollen ESA (arrowheads) at the right enthesis (A). A small linear calcification (crosses, B) and regional hetero-echogenicity were also noted (void arrows, C). The corresponding probe positions at different levels of posterior medial iliac crest (D). US-guided injection of the ESA enthesis (E).

Received 27.01.2022 Accepted 07.02.2022
Med Ultrason
2022, Vol. 24, No 1, 120-121, DOI: 10.11152/mu-3596,
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ESA overlies the ESM dorsally in the lumbar region and fuses with the thoracolumbar fascia caudally, attaching to the iliac crest and sacrum [1]. Although ESA has been proposed as a pain generator of lower back [2], image-based pathological findings are rarely reported.

However, US-guided injection of the ESA enthesis has been proposed as an effective method in treating iliac crest pain syndrome [3]. On US examination, the ESA can be visualized between the thoracolumbar fascia superficially and ESM deeply, as a band-like hyperechoic structure [4]. Our case demonstrated typical sonographic findings of ESA enthesopathy and its potential role in non-specific low back pain.

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Ultrasound guidance may be beneficial for localizing the atrophied muscles in electromyography

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Dear Editor,

A 70-year-old man received a total endovascular repair of thoracic aortic aneurysm with left axillary arterial catheterization. Inability to flex left thumb, index and middle fingers was noted immediately after surgery. Additionally, he experienced numbness over left index and middle fingers and visited the rehabilitation clinic. Physical examination revealed poor left thumb and index finger flexion with atrophied left thenar and forearm muscles. Tinel sign was elicited at the left axillary region.

Three months after surgery, nerve conduction studies revealed prolonged distal motor latency with decreased compound motor action potential and nearly absent sensory nerve action potential in the left median nerve. EMG needle was inserted into pronator teres (PT) using surface anatomy for localization but failed to precisely locate flexor pollicis longus (FPL) as the expected increased spontaneous activities were not observed. Ultrasound (US)-guided muscle samplings were applied and there were marked spontaneous activities in FPL and flexor digitorum superficialis (FDS) (fig 1a,b). Denervation signs, including hyperechoic texture and decreased volume, were observed in multiple median-innervated forearm muscles (fig 1c,d). US nerve tracking revealed focal swelling of the median nerve with loss of typical honeycomb appearance next to the left axillary artery. These findings were indicative of proximal median neuropathy at axillary level.

US guidance has been significantly important for precise EMG samplings of atrophied muscles because it not only provide precise localization but also prevents unnecessary neurovascular injuries. Here, accidental radial artery puncture might have occurred without US guidance during FPL sampling, considering their adjacency. US is useful in detecting muscles' denervation changes, with respect to their nerve innervation. The denervation

Received 27.11.2021 Accepted 23.01.2022
Med Ultrason
2022, Vol. 24, No 1, 121-122, DOI: 10.11152/mu-3548,
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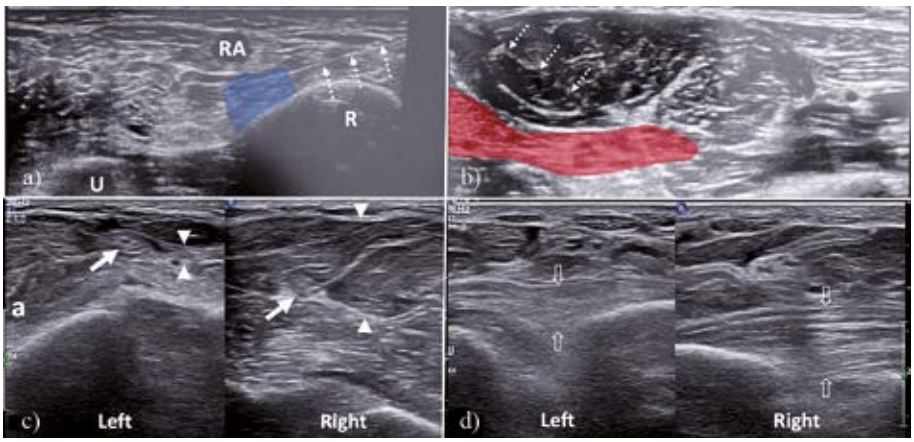

Fig 1. Ultrasound-guided electromyography needle sampling of left (a) flexor pollicis longus (FPL) (blue area) and (b) flexor digitorum superficialis (FDS) muscles (red area). Radial artery (RA) lied closely above the atrophied FPL muscle (blue area). Denervation signs, including hyperechoic texture and decreased volume, of median-innervated muscles were noted at (c) proximal and (d) distal forearm levels. As muscles atrophied (left), median nerve (arrow) became more superficial. Dashed arrow, electromyography needle; open arrow, pronator quadratus muscle; arrowhead, flexor digitorum superficialis muscle; R, radius; U, ulna.

pattern of muscles may infer the nerve injury site [1]. In our case, atrophied left forearm flexors appeared hyperechoic under US, indicating median nerve injury level was at or proximal to elbow level. Since all median-innervated muscles lie within the forearm and hand, injury level cannot be determined only by EMG when the median nerve is injured above the elbow. US nerve tracking provides additional morphological information on the injured nerve when incorporated into electrodiagnostic studies [2]. In conclusion, we suggest combining US and EMG which could make electrodiagnostic studies more precise and safer.

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Imaging findings of a tall cell variant of papillary breast carcinoma

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Received 20.01.2022 Accepted 23.01.2022
Med Ultrason
2022, Vol. 24, No 1, 122-123, DOI: 10.11152/mu-3592,
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To the Editor,

A 63-year-old female with a left breast mass that appeared 5 years ago was hospitalized, due to nipple bleeding for 1 week. Occasionally, a little milk-like or light-yellow liquid flowed out of the nipple. We performed breast ultrasound (US), magnetic resonance imaging (MRI) and molybdenum target imaging for diagnostic purpose.

A cystic solid nodule was seen in the left breast at 12 o'clock, with a size of approximately 18×10 mm, clear

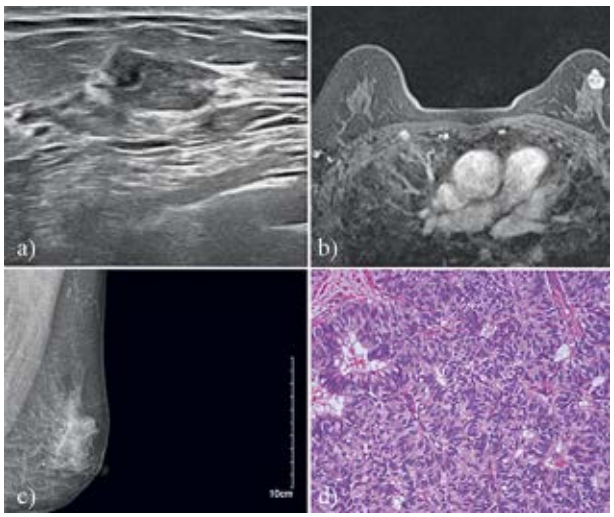

Fig 1. a) Breast ultrasound: A cystic solid nodule, clear boundary, angular edges and uneven internal echo; b) Breast MRI: The scanning lesions are unevenly enhanced, and the time signal curve is flat; c) Breast molybdenum target: Circular equal density mass shadow, irregular contour; d) Histological manifestations: The nuclei of neoplastic columnar epithelium are reversed in a polar direction.

boundary, angular edges and uneven internal echo on breast US (fig 1a). Breast MRI revealed a mass of approximately 1.5×1.4×1.4 cm in the left outer upper quadrant, with a slightly low signal on T1WI, high signal on T2WI lipid suppression sequence, high signal on DWI, and no decrease in ADC signal. After enhancement, the scanning lesions were unevenly enhanced, and the time the signal curve was flat (fig 1b). Breast molybdenum target imaging depicted circular equal density mass shadow in the upper quadrant of the left outer breast, with fuzzy edge, irregular contour, length, and diameter of approximately 1.5 cm (fig 1c). The left breast was scattered with circular and spotted calcifications, and no obvious calcification was found in the right breast.

Our patient underwent left breast-conserving and sentinel lymph node biopsy. Postoperative pathology revealed a high cell subtype papillary carcinoma in the left breast (fig 1d). Immunohistochemistry revealed that PR, CerbB-2, p63, calponin, Syn, CD56, CgA, TG, TTF-1, TTF1, and TG were negative, while CK7, ER, EMA, GCDFP-15, GATA3 and CK19 were positive.

The tall cell variant of papillary breast carcinoma is a rare subtype of invasive breast cancer, characterized by high polarity columnar cells with nuclear polarity reversal. Eusebi et al [1] reported five cases of malignant tumours with primary breast histomorphology similar to thyroid high cell subtype papillary carcinoma.

US is the first choice of imaging examination for breast tumors, with the advantages of convenience and non-invasiveness. However, sometimes, doctors may be inexperienced in diagnosing such rare breast cancer subtypes, leading to misdiagnosis. We believe that for the preoperative evaluation of breast tumours, breast ultrasound, MRI and molybdenum target imaging should be performed at the same time to achieve diagnostic accuracy.

The clinical course of high cell subtype papillary breast carcinoma is slow and it is a low-grade malignant tumor [2]. Our patient's left breast tumour of 5 years also suggested that the tumour grew slowly. We believe that breast-conserving surgery plus anterior sentinel lymph node biopsy should be considered, followed by close follow-up. After surgery, radiotherapy, chemotherapy, or targeted therapy may be performed based on personalized comprehensive evaluation of pathological results.

Acknowledgements: This study was supported by the 2020 New Interdisciplinary Construction Project Of Shanghai Pudong New Area Health (PWXx2020-06).

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Imaging findings of a spindle epithelial tumour with thyroid thymoid differentiation

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To the Editor,

A 81-year-old male who conducted partial thyroidectomy 16 years ago (we have no information about the specific operation method and postoperative pathology), was diagnosed with a spindle epithelial tumour with thymus-like differentiation (SETTLE) in the left residual thyroid.

Thyroid ultrasonography (US) demonstrated a substantial mixed echo lump under the left residual thyroid, 32×26×45 mm, ovalize, uneven internal echo with internal dot strong echo, smooth and clean edge, no obvious acoustic halo and no evident change in the posterior echo (fig 1a). Colour Doppler showed a blood flow signal in the internal and edge portion (fig 1b).

The tumour showed biphasic differentiation, which was a typical component of spindle cells with different degrees of fibrosis. Spindle cells were arranged in a staggered beam, small cytoplasm, long and thin nucleus, fine chromatin, unclear nucleolus, few nuclear fission, visible epithelial components, and the cells were arranged in a tubular, papillary, striate, and glandular pattern. In immunohistochemistry, adenoids of the tumour CK broad spectrum and EMA expression were strong (fig 1c) and spindle cell cytoplasm CK, vimentin and P63 were expressed (fig 1d). The Thyroglobulin, TTF1, Desmin, CD5, CD117, Calcitonin and CD34 did not express.

SETTLE is a dramatically rare and low-degree malignant tumour in the thyroid. In 1991, Chan and Rosai [1] reported about SETTLE for the first time and found that ectopic hamartoma type thymoma, ectopic thymoma, Spindle epithelial tumour with thymus-like differentiation and thyroid carcinoma with adenoid differentiation. In addition, they listed a series of tumour pedigree concepts that indicated the thymus characteristics on the neck successively from benign to malignant. As far as we know, less than 50 cases were published, mainly in children, young people and rarely in elders [2].

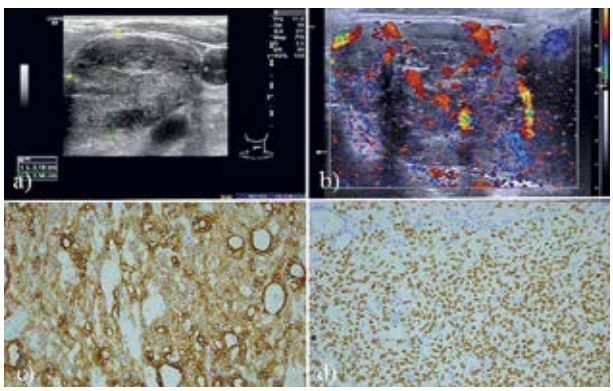

Fig 1. a) Thyroid ultrasound demonstrated a mixed echo lump under the left thyroid; b) colour Doppler aspect of the mass; c) immunohistochemical CK tumour cells turned to be positive; d) immunohistochemical P63 tumour cells were found to be positive.

To our knowledge our case is the oldest SETTLE patient. After complete surgical excision, the post-operation follow-up after 28 months reported a favourable prognosis. SETTLE has low degree malignancy, long-term occurrence and the distant metastasis, in particular the blood bank transfer, appear in an advanced stage. It is usually transferred into the lung with possible local lymph node metastasis, but even after metastasis, the majority of patients have demonstrated a relatively long lifetime [3,4].

In our case, the patient underwent left thyroidectomy 16 years ago and it was impossible to identify whether her SETTLE was a recurrent case. The postoperative

Received 08.01.2022 Accepted 23.01.2022
Med Ultrason
2022, Vol. 24, No 1, 124-125, DOI: 10.11152/mu-3575,
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follow-up after 28 months did not show recurrence or metastasis, but further observation is needed.

Acknowledgements: This study was supported by the 2020 New Interdisciplinary Construction Project Of Shanghai Pudong New Area Health (PWXx2020-06).

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Ultrasound and clinical findings of hyalinizing trabecular tumor of the thyroid

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To the Editor

A 47-year-old female incidentally found a lump, about the size of a pecan, in her right neck. At clinical exam a 3-cm diameter nodule in the right anterior neck, non-tender, with clear border and mobile with swallowing was found.

Thyroid ultrasound (US) evidenced in the right thyroid a 30×20×45 mm hypoechoic mass with clear boundary (fig 1a), aspect ratio <1, uneven internal echo, abundant blood flow signal, resistance index of 0.64 and TI-RADS class of 4a.

Gross inspection during a right thyroidectomy showed that the nodules had approximately 4.0×3.0 cm and a clear border. The intraoperative freezing report demonstrated a right thyroid follicular tumor. The primary consideration was hyalinizing trabecular tumor (HTT). Postoperative pathology confirmed the right thyroid HTT diagnosis (fig 1b). Immunohistochemistry: CK(+), Thyrogloblin(+), TTF-1(+), CK19(-), Galectin-3(-), Calcitonin(-), CGA(-), Syn(-). The postoperative recovery was good.

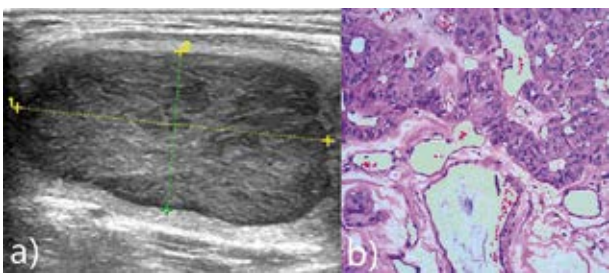

Fig 1. Thyroid ultrasonography evidenced a low-echo nodule in the right gland, bounded and irregular, with uneven internal echoes. b) Microscopically, the tumor has a hyalinizing fibrosis around the blood vessels (hematoxylin and eosin stain ×200).

HTT is an extremely rare tumor of follicular origin, named also paraganglioma, transversely trabecular adenoma or papillary carcinoma. It is thought to originate from thyroid follicular epithelium, but its etiology remains unclear. In a small number of patients, the condition is associated with radiation exposure, but some scholars speculate that some patients with HTT had the condition in relation to chronic lymphocytic thyroiditis [1].

US shows poor specificity in identifying HTT that can be easily misdiagnosed as thyroid adenoma, papil-

Received 30.01.2022 Accepted 01.02.2022
Med Ultrason
2022, Vol. 24, No 1, 125-126, DOI: 10.11152/mu-3601,
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lary carcinoma or other tumors [2], being round or oval, solid, hypoechoic and clear. Few nodules have unclear borders, characteristics closely resembling that of papillary thyroid carcinoma but without calcification. Intraoperative frozen section can sometimes help in diagnosing HTT and patients can avoid total thyroidectomy [3]. Although most of them are benign tumors, there are still a few with malignant potential, recurrence, or even metastasis risk. Therefore, patients with malignant potential need close and regular follow-ups post-operation.

US is the first choice for the imaging examination of thyroid nodules as it is a non-invasive, radiation-free, convenient and fast tool. However, rare thyroid tumors may be easily misdiagnosed as thyroid cancer.

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Comment on "Usefulness of lung ultrasound in the early identification of severe COVID-19: results from a prospective study"

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Dear Editor,

We would like to share ideas on "Usefulness of lung ultrasound in the early identification of severe COVID-19: results from a prospective study [1]." Hernández-Píriz et al noted that *"The combination of the ultrasound score and the presence of respiratory failure can easily identify patients with a higher risk to present complications* [1]*."* We agree that ultrasound might be useful for early detection of severe COVID-19. Results in this report are concordant with those reported by Chardoli et al [2]. However, Chardoli et al observed that ultrasound finding on anterior lung field has little clinical value for prediction of clinical severity [2]. Nevertheless, the prognosis of the patients also depends on other factors including to underlying concurrent medial disorder and appropriate treatment of the illness. Additionally, ultrasound tool might not be available in remote area of poor countries. In case that ultrasound tool is required, experience of user is important. A good training and proficiency control are required to maintain the usefulness of ultrasound for early diagnosis of severe COVID-19 [3].

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Received 12.11.2021 Accepted 09.01.2022
Med Ultrason
2022, Vol. 24, No 1, 126, DOI: 10.11152/mu-3494,
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Comment on "Usefulness of lung ultrasound in the early identification of severe COVID-19: results from a prospective study"

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To the Editor,

We have read the paper of Hernández-Píriz et al [1] with great interest, where a pattern of correlation was established between lung ultrasound (LUS) findings and the degree of respiratory failure and prognosis in patients with COVID-19. However, we think that some aspects of this study could have been better analyzed.

In this study the timing from hospital admission to LUS evaluation is unclear. Particularly, it is not specified if patients were receiving any non-invasive ventilatory support while performing LUS since they were transferred to the hospital on average of 2.51±3.95 days from arrival at the emergency department (ED). This aspect may be relevant since the use of High-Flow Nasal Cannula Oxygen Therapy (HFNCOT) could improve lung aeration as well as Non-Invasive Ventilation (NIV) induces alveolar recruitment thus affecting LUS evaluation [2].

Also, the authors did not incorporate diaphragm ultrasonography, which may be an interesting parameter to evaluate respiratory compromise.

About methodology, criteria for initiating NIV have not been defined. Also, to assess the relation between LUS findings and degree of respiratory failure, other endpoints could be considered: need to increase standard oxygen therapy [3] or use of HFNCOT [4]. Moreover, pulse-oximetric saturation (SpO2) was used when arterial blood gas analysis was not available: controversies exist about the Severinhause-Ellis equation since SpO2 is dependent on variables related to patient (local perfusion, temperature) and therefore not as reliable as blood gas analysis.

About patient selection, LUS findings in COVID-19 can occur in other pathological processes such as bacterial pneumonia, left ventricular failure, atelectasis and fibrosis. For this reason, studies about this topic have considered different exclusion criteria: diagnosis of cardiogenic acute pulmonary oedema and interstitial lung disease [5], bacterial pulmonary superinfection [4], lung malignancy or lobectomy [6]. Furthermore, it is possible that some patients with mild disease may have been discharged from ED and excluded from the study thus affecting the prevalence of LUS findings.

Further clinical trials are required to evaluate the correlation between LUS and outcome in COVID-19.

Received 20.01.2022 Accepted 09.02.2022
Med Ultrason
2022, Vol. 24, No 1, 127, DOI: 10.11152/mu-3591,
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Author's Reply

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Dear Editor,

We read with interest the comments sent by Di Costanzo et al. The authors agree on the potential role of lung ultrasound (LUS) and the degree of respiratory failure and prognosis in patients with COVID-19 [1] but raise some methodological questions.

First, we would like to highlight that the study was carried out in a field hospital, during the first wave of the pandemic in Spain, to decongest hospitals. That is why we did not have the facilities used in conventional hospitals. Patients were admitted to a conventional Internal Medicine ward. Only 5 of the 107 patients had received positive ventilatory support [2] before LUS (2 of them in the first 10 hours), this is unlikely to have an impact. None had High-Flow Nasal Cannula Oxygen Therapy (HFNCOT). The timing from admission to LUS evaluation was 7.64±4.13 days and we wanted to emphasize the number of days from symptom onset as an important marker to develop adult respiratory distress syndrome (ARDS).

Regarding diaphragmatic ultrasound we agree it is an interesting parameter worth to study, however, our study focused on alterations of the lung parenchyma and the severity of ARDS and, at that moment, was not considered.

We agree that the use of partial pressure of oxygen is more reliable than oxygen saturation by pulse oximetry, however, we did not have access to a 24-hour laboratory to perform it.

Although many patients with mild disease were not admitted, our aim was to correlate the ultrasound findings with respiratory failure, and in other studies it has been shown that these patients with mild disease have little sonographic abnormalities [3].

The possibility of other processes was also studied, since an echocardiogram was performed along with LUS, with no evidence suggesting heart failure, bacterial superinfection and none of our patients had a history of pulmonary fibrosis at the time of inclusion in the study.

The criteria for starting NIV were severe dyspnea, tachypnoea over 30 bpm, PaO2/FiO2 <200 (or the need for FiO2 greater than 0.4 to achieve an SpO2 of at least 92%) or acute ventilatory failure (pH <7.35 with PaCO2 >45 mm Hg).

We appreciate the comments and agree that it is necessary new well-designed studies to provide new insights on the correlation between LUS and prognosis of COVID-19.

References

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