Pleural Disease Assessment and Outcomes

P1 PLEURAL EFFUSION SIZE ESTIMATION: US, CXR OR CT?

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Introduction and objectives Chest X-ray (CXR), CT and Ultrasound (US) are commonly used to evaluate the size of pleural effusions. Accurate description of size is important in the communication of findings and urgency of intervention. With currently no standardised measurement system, significant variation in description of size by CXR, CT or US exists. The use of terms 'small, moderate, and large' is common, with no consensus on the limits of these sizes.

This study looked at correlation between qualitative description of effusion size by different imaging modalities and volume of effusion recorded following aspiration.

Methods This was a retrospective analysis of patients referred for pleural tap and/or drain after CXR and/or CT. CXR/CT reports were collected from PACS, US reports from the local US database, accessed by at least two US-trained Respiratory physicians.

Effusion size was estimated by the recognised method of counting intercostal spaces (ICS) from costophrenic angle (small- localised to 1 ICS, medium 2–3 ICS, large ≥4 ICS). Effusion size reported was compared to actual volume of fluid drained (till 'dry' or 'safe aspiration'). For the purpose of this study, effusions <500 mL were characterised as small, 500–1000 mL moderate and >1000 mL large. Correlation was analysed using Spearman's correlation.

Results 312 patients were referred April 2014–December 2015. 133 patients were excluded due to insufficient data, 179 patients' data analysed. US pleural effusion size estimation correlated most closely with actual volume of fluid drained ($r = 0.833$, $N = 179$, $P < 0.0001$) vs. CXR ($r = 0.548$, $N = 129$, $P < 0.001$) and CT ($r = 0.489$, $N = 107$, $P < 0.001$). The error rate in size estimation was 41% (53/129) for CXR, 57% (61/107) for CT and 16% (28/179) for US. In particular, 29% (31/107) patients with 'small' tapped effusions were reported to be 'medium/large' effusions by CT scan. CT most commonly overestimated fluid present; whilst US tended to underestimate the few cases where it was inaccurate.

Conclusions This study demonstrates that US may be the most accurate modality when assessing the size of pleural effusions. CT imaging may over represent the volume of fluid present. Where imaging reports guide further management, reliability and consistency is essential to avoid unnecessary/urgent intervention and patient anxiety.

P2 INCORPORATION OF AN IN-DEPTH THORACIC ULTRASOUND ASSESSMENT INTO ROUTINE PRE-PROCEDURAL EVALUATION OF PATIENTS WITH PLEURAL EFFUSIONS

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Background Pleural disease affects 1 in 300 people annually; furthermore, the incidence of malignant pleural effusion (MPE) is increasing with over 40,000 cases each year in the UK alone. A significant minority of patients will have non-expandable lung (NEL) secondary to underlying disease. At present, there is no way of pre-emptively identifying these individuals; with current strategies such as pleural manometry requiring invasive intervention. Early recognition of patients with NEL would streamline care and allow them to be offered appropriate treatment; i.e., indwelling pleural catheter insertion rather than chemical pleurodesis. Recent research[1] has described the novel use of thoracic ultrasound (TUS) to identify NEL by assessing mobility and compliance of the atelectatic lung within an effusion. However, this work has not been replicated and was delivered by researchers with expertise and facilities not used by or available to most practitioners.

Method We incorporated an in-depth TUS protocol into the pre-procedural assessment of patients undergoing intervention for suspected MPE, where ≥500 mL of fluid was expected to be drained. TUS images were acquired by two chest physicians with RCR level 1 competence or above. Data recorded included size and characteristics of the effusion; presence of pleural thickening; behaviour of the lung and diaphragm; and M-mode displacement with cardiac impulse of the atelectatic lung during breath hold manoeuvres. NEL was determined using post-drainage imaging (chest X-ray and/or CT) and clinical notes.

Results 34 patients underwent in-depth TUS evaluation (Table 1). Image acquisition and measurements took no more than five minutes in any patient. Poor M-mode displacement (<0.8 mm) was only seen with NEL, whilst good movement (>1.2 mm) was

Abstract P2 Table 1 In-depth thoracic ultrasound (TUS) findings in 34 patients undergoing pleural drainage for suspected malignant disease

		POST-DRAINAGE LUNG CHARACTERISATION		
		Free (*n* = 23)	Indeterminate (*n* = 5)	Non-expandable (*n* = 6)
Static TUS features				
Effusion side	Right	11/23	5/5	5/6
	Left	12/23	0/5	1/6
Effusion size	Moderate	10/23	2/5	4/6
	Large	13/23	3/5	2/6
Septations evident		2/23	2/5	4/6
Parietal pleural thickening evident		0/23	0/5	1/6
Visceral pleural thickening evident		0/23	0/5	3/6
Distinct pleural nodularity evident		5/23	4/5	2/6
Dynamic TUS features				
Paradoxical motion of diaphragm evident		9/23	2/5	3/6
Free movement of atelectatic lung evident		22/23	3/5	2/6
Clear inspiratory expansion of atelectatic lung evident		7/23	0/5	0/6
M-mode motion of atelectatic lung	<0.8 mm; *n* (%)	0/23	0/5	5/6
(inspiratory hold, near or approaching TLC)	0.8–1.2 mm; *n* (%)	7/23	3/5	1/6
	>1.2 mm; *n* (%)	16/23	2/5	0/6
M-mode motion of atelectatic lung	<0.8 mm; *n* (%)	0/23	0/5	3/6
(expiratory hold, near or approaching RV)	0.8–1.2 mm; *n* (%)	2/23	1/5	3/6
	>1.2 mm; *n* (%)	21/23	4/5	0/6