Hemorrhagic Complications of Percutaneous CT-Guided Lung Biopsy in Patients with Pulmonary Hypertension: A Systematic Review and Meta-Analysis

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Rationale

- PCTLB is a frequently used procedure in the work-up of suspected lung cancer
- PH is traditionally considered to be a risk factor for hemorrhage in PCTLB
- Patients diagnosed with PH are reported to also be at elevated risk of lung cancer

Objective

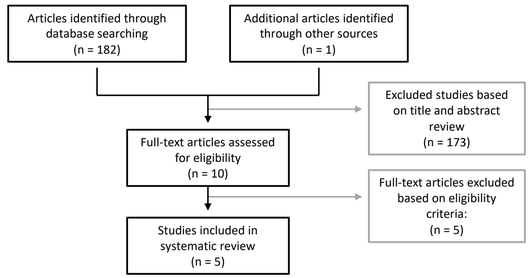
Does percutaneous CT-guided lung biopsy (PCTLB) in patients with pulmonary hypertension (PH) compared to patients without PH have a greater risk of complications such as pulmonary hemorrhage or hemoptysis?

Methods

- We searched PubMed, Embase, CINAHL, Cochrane Library, and bibliographies of search results for studies reporting frequency of hemorrhagic complications of PCTLB in adult patients with evidence of PH compared to patients undergoing the procedure without evidence of PH.
- Study selection and data abstraction were performed by two investigators working independently.
- Random-effects meta-analysis was performed for both rates of pulmonary hemorrhage and hemoptysis.

Results

Study Selection



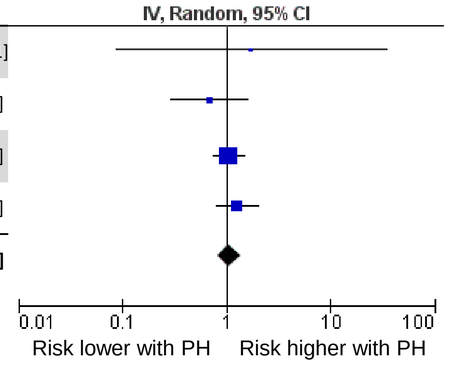
Characteristics of Individual Studies

Study	Year	Design	Study Location	Number of Biopsies	Number of Biopsies (PH)	Mean Age	% Male Patients
Chakrabarti et al	2009	Retrospective	UK	134	6	68	54.8
Digumarthy et al	2016	Retrospective	USA	113	74	67	54.9
Tai et al	2016	Retrospective	USA	1175	319	65	44.1
Hwang et al	2018	Retrospective	Korea	4172	838	64	59.5
Zhu et al	2020	Retrospective	China	1090	514	58	69.9

Risk of Pulmonary Hemorrhage

Study	Modality	Definition of PH	Event	No event	Weight	OR	95% CI
Chakrabarti	CT	mPAD > 29 mm	0	6	0.8%	1.73	[0.09–34.71]
		mPAD ≤ 29 mm	5	123			
Digumarthy	TTE	RVSP ≥ 35 mmHg	19	55	9.5%	0.69	[0.30–1.61]
		RVSP < 35 mmHg	13	26			
Tai	CT	mPAD ≥ 2.95 cm	56	263	58.7%	1.38	[0.97–1.95]
		mPAD < 2.95 cm	144	707			
Zhu	CT	mPAD ≥ 2.95 cm	40	474	31.1%	1.27	[0.79–2.02]
		mPAD < 2.95 cm	36	540			
Total			**115**	**798**	**100.0%**	**1.07**	**[0.83, 1.39]**
			198	**1396**			

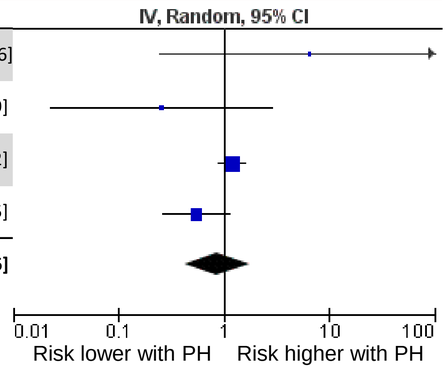
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.64$, df = 3 (P = 0.65); $I^2 = 0\%$
Test for overall effect: Z = 0.52 (P = 0.61)



Risk of Hemoptysis

Study	Modality	Definition of PH	Event	No event	Weight	OR	95% CI
Chakrabarti	CT	mPAD > 29 mm	0	6	4.3%	6.54	[0.24–176.6]
		mPAD ≤ 29 mm	1	127			
Digumarthy	TTE	RVSP ≥ 35 mmHg	1	73	7.4%	0.25	[0.02–2.89]
		RVSP < 35 mmHg	2	37			
Hwang	CT	mPAD > 29.5 mm	55	783	52.5%	1.19	[0.87–1.62]
		mPAD ≤ 29.5 mm	186	3148			
Zhu	CT	mPAD ≥ 2.95 cm	11	503	35.9%	0.55	[0.26–1.15]
		mPAD < 2.95 cm	22	554			
Total			**67**	**1365**	**100.0%**	**0.87**	**[0.43, 1.76]**
			211	**3866**			

Heterogeneity: $Tau^2 = 0.22$; $Chi^2 = 6.08$, df = 3 (P = 0.11); $I^2 = 51\%$
Test for overall effect: Z = 0.40 (P = 0.69)



Conclusions

A systematic review of the literature did not demonstrate that patients with indirect evidence of pulmonary hypertension undergoing PCTLB had an increased risk of hemorrhagic complications.

The retrospective study designs and the use of non-gold standard modalities of assessing for presence of PH in the studies reviewed suggest that higher quality evidence is needed to make more definitive conclusions about the safety of PCTLB in patients with PH.