

Systematic Review of Coronary Air Embolism Following Percutaneous Lung Biopsy

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Background

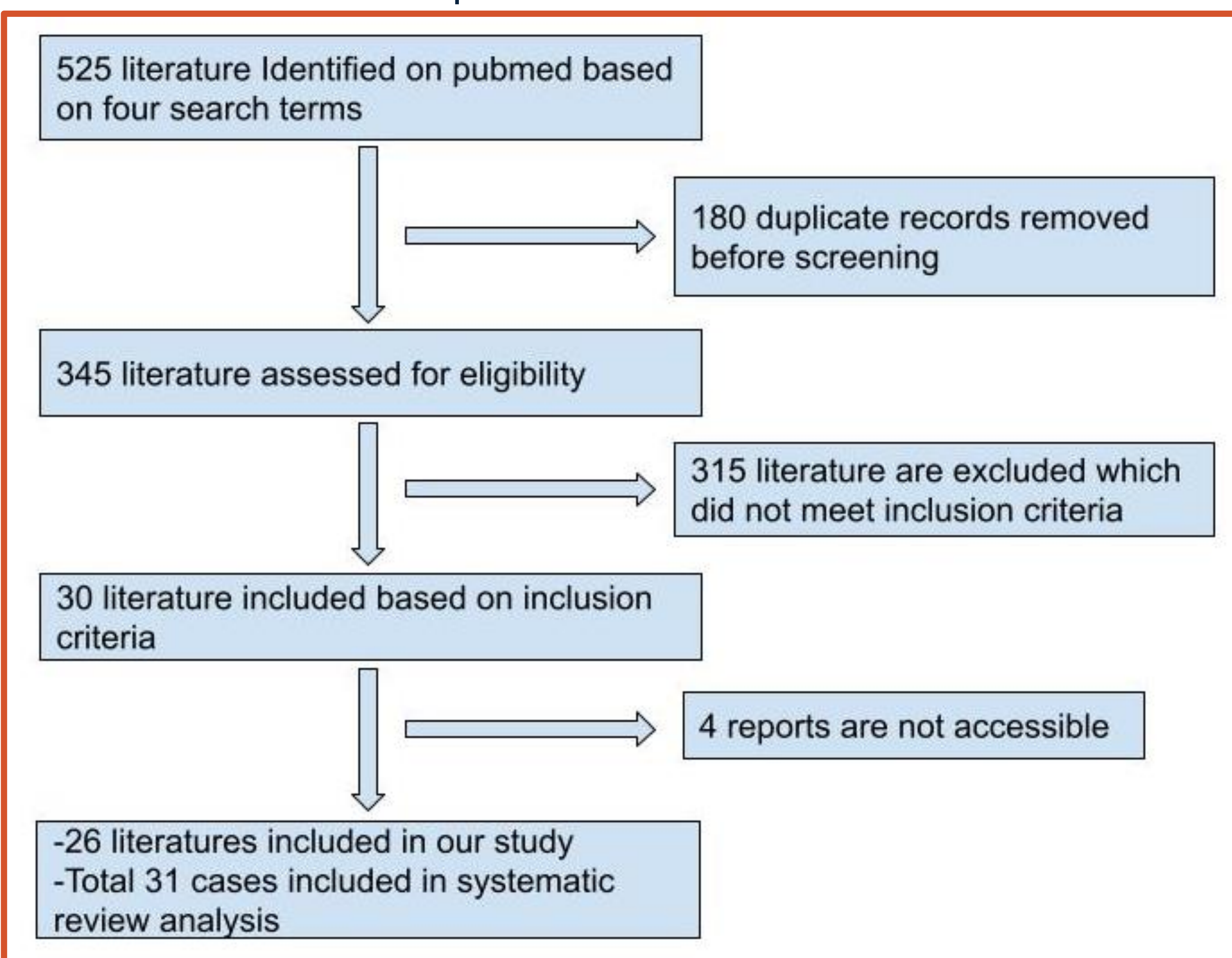
- Coronary Air Embolism (CAE) following CT-guided percutaneous lung biopsy is a rare complication with the potential for fatal consequences.
- Additional research is needed to identify risk factors and early symptoms in CAEs in order to improve outcomes.

Objectives

- Identify potential risk factors for CAE
- Compare CAE incidence by technique
- Compare outcomes of CAE

Methods

- Searched PubMed for the terms: “coronary air embolism” OR “coronary air embolus” AND “CT” OR “percutaneous”
- 4 independent reviewers screened all studies to identify 31 unique case reports.
- Data extraction of baseline demographic characteristics, patient positioning, lobar location of biopsy, needle gauge size, symptoms, interventions, EKG changes, and mortality.
- Cases that did not report all data were excluded.



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Results

Metric	Parameters	Count	Prevalence	PRR
Age (median 67yo)	>=65	20	64.52%	1.82
	<65	11	35.48%	
Sex	Male	24	77.42%	3.43
	Female	7	22.58%	
Biopsy lesion laterality	Right	16	51.61%	1.07
	Not Right	15	48.39%	
Lobar Location	LLL	5	16.13%	0.19
	Not LLL	26	83.87%	
Biopsy method	Core Biopsy	25	80.65%	4.17
	Not Core Biopsy	6	19.35%	
Patient Position	Supine	13	41.94%	0.72
	Not Supine	18	58.06%	
Biopsy Needle Gauge	<19	12	38.71%	0.63
	Not <19	19	61.29%	
Cough	Yes	11	35.48%	0.55
	No	20	64.52%	
Cardiac Arrest	Yes	8	25.81%	0.35
	No	23	74.19%	
Location of CAE	RCA	23	74.19%	2.88
	Not RCA	8	25.81%	
Hyperbaric O2	Yes	9	29.03%	0.41
	No	22	70.97%	
Mortality	Survived	24	77.42%	3.43
	Expired	7	22.58%	

Metric	Parameters	Expired	Survived	IRR
Age (median 67yo)	>=65	4	16	0.25
	<65	3	8	0.38
Sex	Male	5	19	0.26
	Female	2	5	0.40
Biopsy lesion laterality	Right	2	14	0.14
	Not Right	5	10	0.50
Lobar Location	LLL	3	2	1.50
	Not LLL	4	22	0.18
Biopsy method	Core Biopsy	5	20	0.25
	Not Core Biopsy	2	4	0.50
Patient Position	Supine	2	11	0.18
	Not Supine	5	13	0.38
Biopsy Needle Gauge	<19	3	9	0.33
	Not <19	4	15	0.27
Cough	Yes	3	8	0.38
	No	4	16	0.25
Cardiac Arrest	Yes	6	2	3.00
	No	1	22	0.05
Location of CAE	RCA	4	19	0.21
	Not RCA	3	5	0.60
Hyperbaric O2	Yes	2	7	0.29
	No	5	17	0.29

Discussion

- CAE following CT-guided percutaneous lung biopsies warrants additional research as CAE carries a high mortality.
- CT-guided percutaneous needle biopsy is becoming more common for lung tumor diagnosis.
- CAE most likely result from iatrogenic introduction of gas bubbles into the bloodstream, likely caused by:
 - Communication between pulmonary veins and atmosphere
 - Bronchovenous fistula or other air-containing spaces and pulmonary veins attributed to needle puncture
 - Air from pulmonary arterial circulation traversing through pulmonary microvasculature and reaching pulmonary venous circulation.
- Coronary air embolism can result in myocardial infarction, cardiac arrest, or arrhythmias.
- Our review found that CAE were more common in the RCA, likely due to the anterior anatomical location of the RCA origin allowing air to pass to the RCA
- Further studies may shed light on a potential increased risk for CAE in left-sided lung biopsies compared to right, and to what degree hyperbaric oxygen therapy may improve outcomes.

Conclusions

- RCA was the most common site
- Hyperbaric O2 therapy showed a survival benefit
- Further studies needed to identify risk factors
- Data limited by case reporting

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