

Does surgical technique influence the development of lung metastasis in patients with pathologic long bone fractures?

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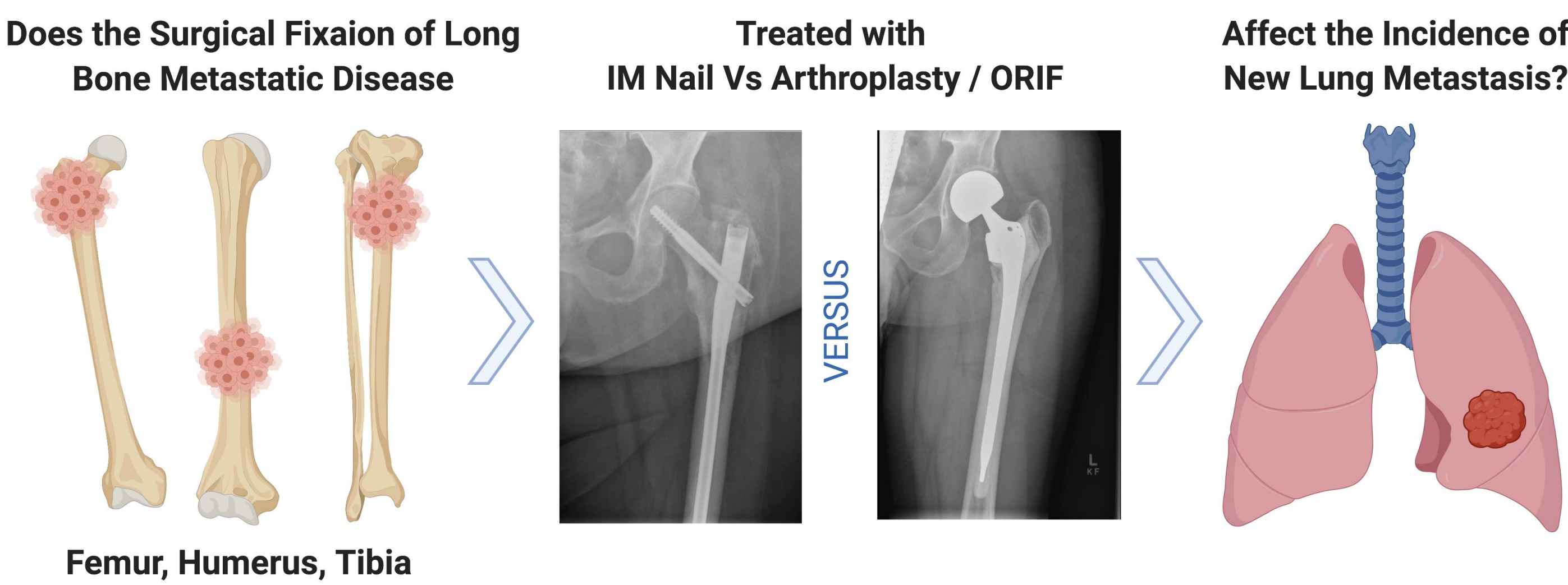


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Background

- Surgical management of established and impending metastatic long bone fractures have been shown to significantly improve post-surgical outcomes in cancer patients:
 - ↓ pain, ↑ ambulation, and ↑ quality of life
- Surgical treatment options are varied and include intramedullary nail fixation (IMN), open reduction and internal fixation (ORIF), and arthroplasty
- A potential complication of IMN fixation of metastatic long bone fractures is the intravasation of tumour emboli with subsequent pulmonary dissemination

It is unclear how different surgical techniques influence systemic tumour progression to the lungs.

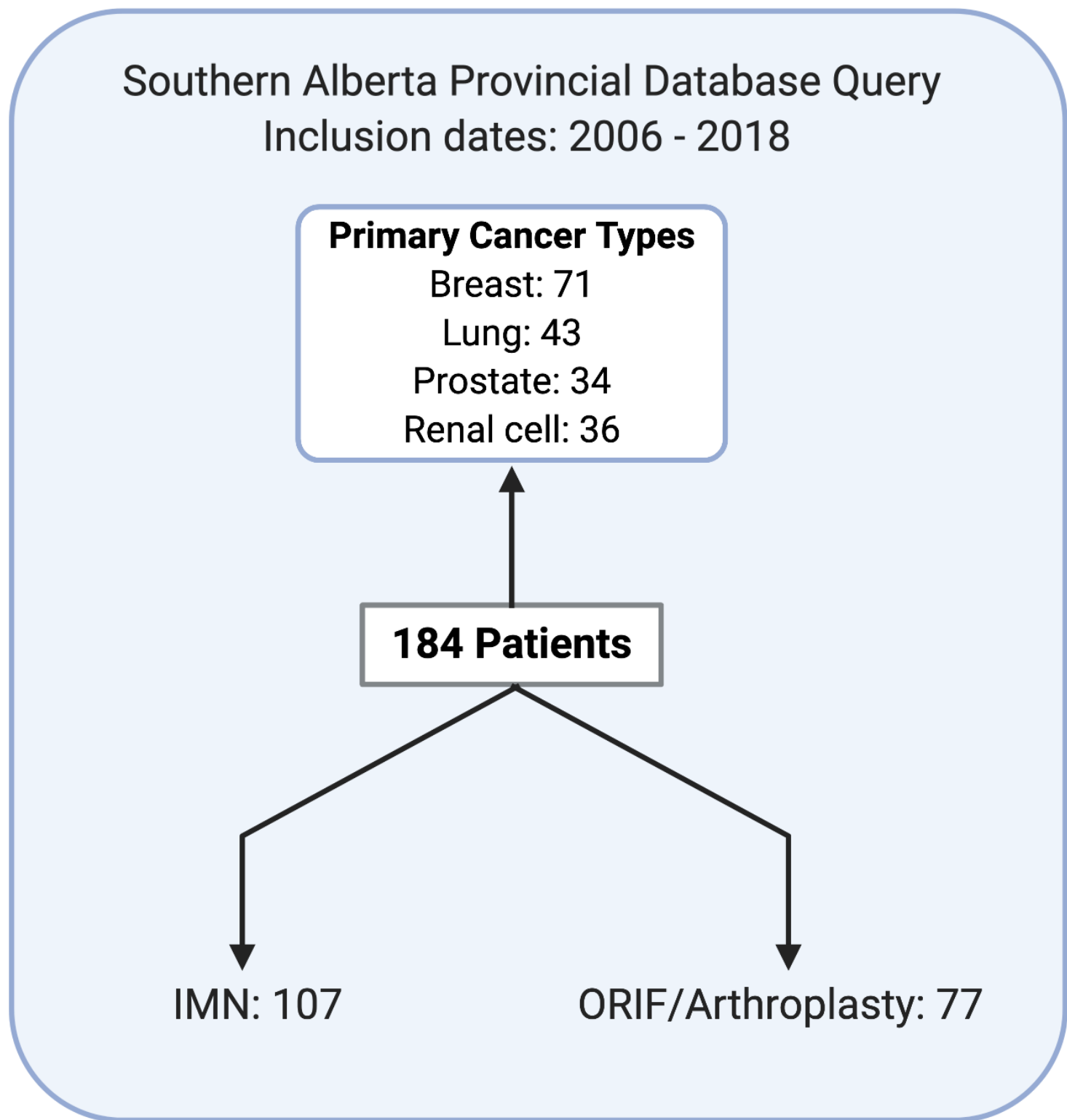


Methods

Retrospective cohort study , IMN vs. ORIF OR Arthroplasty
184 patients surgically treated for metastatic long bone fractures

Inclusion criteria:

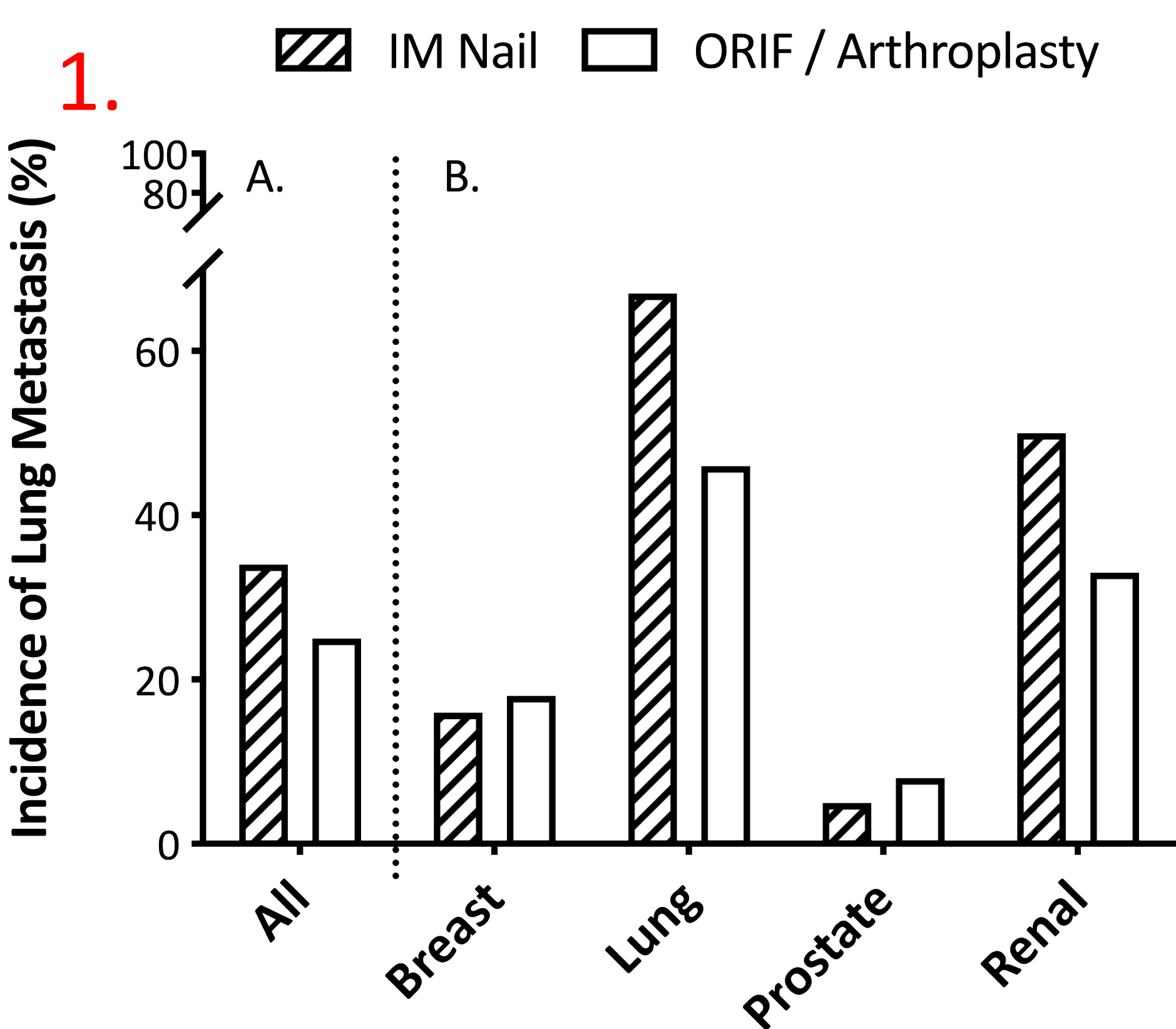
- Single surgically treated pathologic fracture of a long bone (humerus, femur, or tibia)
- Chest imaging (chest X-ray or CT) 3 months prior to surgery
- Follow-up chest imaging:
 - Completed no more than 6 months after surgery if *positive* for disease progression in the lungs
 - Any time after surgery if *negative* for disease progression in the lungs



Statistical analysis conducted using two-tailed Fisher's exact tests, and odds ratios were calculated.

Results

- Of the patients treated with IMN and ORIF/arthroplasty, 34% and 25% respectively were shown to have progressive lung metastases following surgical stabilization of a pathologic fracture.
- There was no significant difference in progressive lung metastases following IMN compared to ORIF/arthroplasty (OR 1.55; CI 0.80-2.98; $p=0.20$).
- Progressive lung metastatic disease at follow up imaging study was significantly associated with 1-year patient mortality (OR 3.78; CI 1.84 – 7.40; $p<0.01$).
- An analysis of primary cancer subgroups did not yield any differences in progressive lung metastasis between IMN vs ORIF/arthroplasty.



Investigation	OR	(95% CI)	p Value
All Cancer			
IMN vs ORIF/Arthroplasty	1.55	(0.80 - 2.98)	0.20
1 Year Mortality			
Stable vs. Progressive*	3.78	(1.84 - 7.40)	<0.01
Subgroup: 1° Cancer			
Breast			
IMN vs ORIF/Arthroplasty	0.84	(0.24 - 2.92)	0.99
Lung			
IMN vs ORIF/Arthroplasty	2.33	(0.62 - 8.81)	0.31
Prostate			
IMN vs ORIF/Arthroplasty	0.60	(0.03 - 10.51)	0.99
Renal			
IMN vs ORIF/Arthroplasty	2.00	(0.52 - 7.69)	0.50

* IMN and ORIF/Arthroplasty combined

Discussion & Conclusions

The results of this study suggest that:

- Metastasis to the lungs following surgery for metastatic long bone lesions has a negative influence on patient mortality
- IMN stabilization of metastatic long bone lesions (breast, lung, prostate or renal) may not have a significantly different rate of disease progression to the lungs compared to ORIF or arthroplasty

Tumour cell dissemination during IM manipulation of metastatic long bone fractures therefore *may not result in a clinically relevant increase in metastatic lung disease*, compared to ORIF or arthroplasty techniques.

Limitations of this study include the retrospective nature, the sensitivity of radiologic detection and the number of patients included.



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