Remote ischaemic conditioning following hip fracture: a proof-of-concept study (RIC-FRACTURE)

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Rationale and Hypothesis

Hip fracture is the commonest fracture in adults over 60 years, with high morbidity and mortality. [1] Remote Ischaemic Conditioning (RIC) is a non-invasive intervention consisting of brief, repeated cycles of limb ischaemia and reperfusion for periods that avoid physical injury to the limbs, but induce neurohormonal, systemic or vascular changes in the body. [2] Studies have demonstrated that RIC may have anti-inflammatory and cardiovascular protective effects following orthopaedic surgery and could represent a novel therapeutic strategy to improve outcomes. [3]

Objectives

Conduct a single-arm proof-of-concept study of RIC following acute hip fracture.

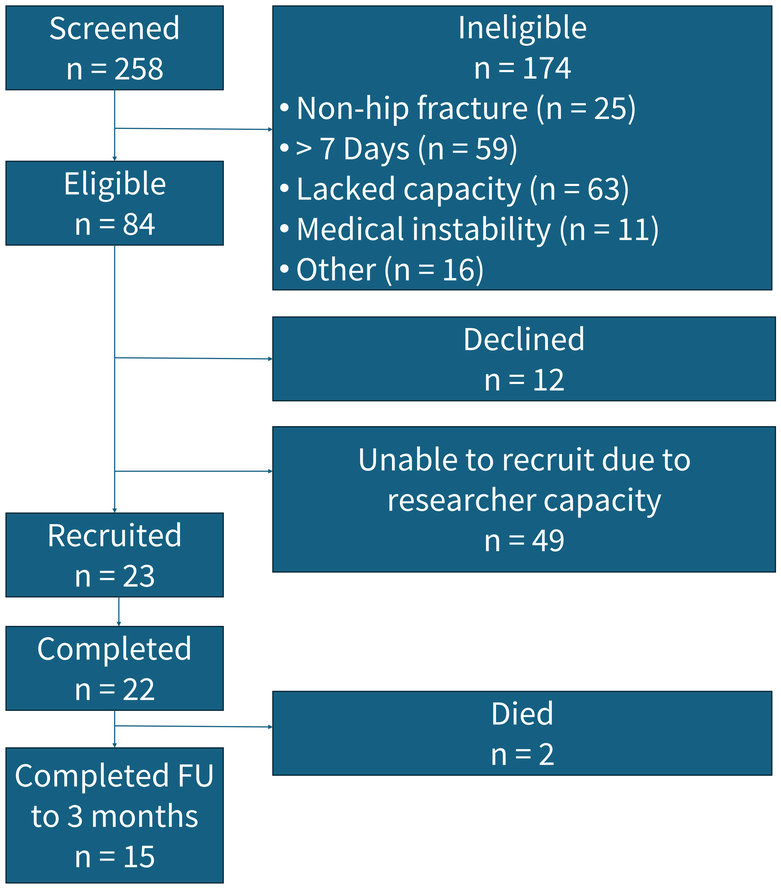
Methodology

Adults with hip fracture following a fall from standing height or less (diagnosed within the last 7 days on X-ray/CT scan) at the Northern General Hospital, Sheffield were identified. RIC was delivered daily for up to two weeks or until discharge (maximum 10 sessions) by trained researchers. Primary outcomes were safety, feasibility, acceptability and compliance. Secondary outcomes included exploratory clinical outcomes.

Conclusion

It is possible to perform RIC following acute hip fracture and a randomised controlled trial is practicable and justified. Future work will explore mechanistic outcomes through blood marker analysis.

Study CONSORT diagram of screening & recruitment



Participant feedback:

"It was definitely uncomfortable to begin with, but it was good to break up the boredom of being in bed all the time"

"Didn't hurt as much as I thought it would"

"I knew I could stop at any time I wanted. But I thought I wanted to help myself as much as I could."

"I'd do it at home if it helped me get better"

Results

Participant characteristics	Median	Interquartile range (IQR)
Age	81	77-86
Comorbidities	5	3-6
Medications	6	3-9
CFS	4	4-5
NHFS	4	4-5
Days to recruitment	4	2-6

		n (%)
Gender	Female	16 (70%)
	Male	7 (30%)
Type of fracture	Intracapsular	12 (52%)
	Extracapsular	11 (48%)
Type of surgery	Dynamic Hip Screw	9 (39%)
	Hemiarthroplasty	8 (35%)
	Total Hip Replacement	3 (13%)
	Intramedullary Nail	3 (13%)

Clinical outcomes of participants	
Mortality	9% (n = 2)
Readmissions in 3 months	9% (n = 2)
Average length of stay	16.6 (range 3-85)
Median change in pain score (visual analogue scale) from baseline to 3 month follow-up	- 2.3
Median change in Barthel Index from baseline to 3 month follow-up	+13
Proportion discharged home	59% (n = 13)

Intervention delivery and adherence	
Proportion of treatments received when offered	82%
Proportion of intended treatments delivered	64%
Average duration of RIC therapy (mean, range)	4.2 days (2-7)

References

1. Leal, J., et al., Impact of hip fracture on hospital care costs: a population-based study. Osteoporos Int, 2016. 27(2): p. 549-58.
2. Baig S et al. Remote ischaemic conditioning for stroke: unanswered questions and future directions. Stroke and Vascular Neurology, 2021. 6(2): p. 298-309.
3. Buck A et al. Role of remote ischaemic conditioning in fracture healing and orthopaedic surgery-a systematic review and narrative synthesis. J Orthop Surg Res. 2025 May 7;20(1):448.