Doppler ultrasound surveillance of recently formed haemodialysis arteriovenous fistula: the SONAR observational cohort study

James Richards,[1,2,3] Dominic Summers,[1,2] Anna Sidders,[4] Elisa Allen,[4] Mohammed Ayaz Hossain,[3] Subhankar Paul,[1,2] Matthew Slater,[1] Matthew Bartlett,[3] Regin Lagaac,[1] Emma Laing,[4] Valerie Hopkins,[4] Chloe Fitzpatrick-Creamer,[4] Cara Hudson,[4] Joseph Parsons,[4] Samuel Turner,[5] Andrew Tambyraja,[6] Subash Somalanka,[7] James Hunter,[8] Sam Dutta,[9] Neil Hoye,[10] Sarah Lawman,[11] Tracey Salter,[7,12] Mohammed Farid Aslam,[13] Atul Bagul,[14] Rajesh Sivaprakasam,[15] George E Smith,[16] Helen L Thomas,[4] Zia Moinuddin,[17] Simon R Knight,[18] Nicholas Barnett,[19] Reza Motallebzadeh[3] and Gavin J Pettigrew;[1,2*] on behalf of the SONAR trial group[20]

[1]Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK
[2]University of Cambridge, Cambridge, UK
[3]Royal Free London NHS Foundation Trust, London, UK
[4]NHS Blood and Transplant Clinical Trials Unit, London, UK
[5]North Bristol NHS Trust, Bristol, UK
[6]Royal Infirmary of Edinburgh, NHS Lothian, Edinburgh, UK
[7]Epsom and St Helier University Hospitals NHS Trust, Epsom, UK
[8]University Hospital Coventry and Warwickshire NHS Trust, Coventry, UK
[9]Nottingham University Hospitals NHS Trust, Nottingham, UK
[10]South Tees Hospitals NHS Foundation Trust, Middlesbrough, UK
[11]Brighton and Sussex University Hospitals NHS Trust, Brighton, UK
[12]Frimley Health NHS Foundation Trust, Frimley, UK
[13]Imperial College Healthcare NHS Trust, London, UK
[14]University Hospitals of Leicester NHS Trust, Leicester, UK
[15]Bart's Health NHS Trust, London, UK
[16]Hull University Teaching Hospitals NHS Trust, Hull, UK
[17]Manchester University NHS Foundation Trust, Manchester, UK
[18]Oxford University Hospitals NHS Foundation Trust, Oxford, UK
[19]Guy's and St Thomas' NHS Foundation Trust, London, UK
[20]See *Appendix 1*

[*]Corresponding author gjp25@cam.ac.uk

Published May 2024
DOI: 10.3310/YTBT4172

Plain language summary

Doppler ultrasound surveillance of recently formed haemodialysis arteriovenous fistula: the SONAR observational cohort study

Health Technology Assessment 2024; Vol. 28: No. 24
DOI: 10.3310/YTBT4172

NIHR Journals Library www.journalslibrary.nihr.ac.uk

Plain language summary

What was the problem?

For people with advanced kidney disease, haemodialysis is best provided by an 'arteriovenous fistula', which is created surgically by joining a vein onto an artery at the wrist or elbow. However, these take about 2 months to develop fully ('mature'), and as many as 3 out of 10 fail to do so.

What was the question?

We asked whether we could use early ultrasound scanning of the fistula to identify those that are unlikely to mature. This would allow us to decide whether it would be practical to run a large, randomised trial to find out if using early ultrasound allows us to 'rescue' fistulas that would otherwise fail.

What did we do?

We invited adults to undergo serial ultrasound scanning of their fistula in the first few weeks after it was created. We then analysed whether we could use the data from the early scans to identify those fistulas that were not going to mature by week 10.

What did we find?

Of the 333 fistulas that were created, about two-thirds reached maturity by week 10. We found that an ultrasound scan 4 weeks after fistula creation could reliably identify those fistulas that were going to mature. However, of those fistulas predicted to fail, about one-third did eventually mature without further intervention, and even without knowing what the early scans showed, another third were successfully rescued by surgery or X-ray-guided treatment at a later stage.

What does this mean?

Performing an early ultrasound scan on a fistula can provide reassurance that it will mature and deliver trouble-free dialysis. However, because scans are poor at identifying fistulas that are unlikely to mature, we would not recommend their use to justify early surgery or X-ray-guided treatment in the expectation that this will improve outcomes.

Health Technology Assessment

ISSN 2046-4924 (Online)

Impact factor: 3.6

A list of Journals Library editors can be found on the NIHR Journals Library website

Launched in 1997, *Health Technology Assessment* (HTA) has an impact factor of 3.6 and is ranked 32nd (out of 105 titles) in the 'Health Care Sciences & Services' category of the Clarivate 2022 Journal Citation Reports (Science Edition). It is also indexed by MEDLINE, CINAHL (EBSCO Information Services, Ipswich, MA, USA), EMBASE (Elsevier, Amsterdam, the Netherlands), NCBI Bookshelf, DOAJ, Europe PMC, the Cochrane Library (John Wiley & Sons, Inc., Hoboken, NJ, USA), INAHTA, the British Nursing Index (ProQuest LLC, Ann Arbor, MI, USA), Ulrichsweb™ (ProQuest LLC, Ann Arbor, MI, USA) and the Science Citation Index Expanded™ (Clarivate™, Philadelphia, PA, USA).

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: journals.library@nihr.ac.uk

The full HTA archive is freely available to view online at www.journalslibrary.nihr.ac.uk/hta.

Criteria for inclusion in the *Health Technology Assessment* journal
Manuscripts are published in *Health Technology Assessment* (HTA) if (1) they have resulted from work for the HTA programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

HTA programme

Health Technology Assessment (HTA) research is undertaken where some evidence already exists to show that a technology can be effective and this needs to be compared to the current standard intervention to see which works best. Research can evaluate any intervention used in the treatment, prevention or diagnosis of disease, provided the study outcomes lead to findings that have the potential to be of direct benefit to NHS patients. Technologies in this context mean any method used to promote health; prevent and treat disease; and improve rehabilitation or long-term care. They are not confined to new drugs and include any intervention used in the treatment, prevention or diagnosis of disease.

The journal is indexed in NHS Evidence via its abstracts included in MEDLINE and its Technology Assessment Reports inform National Institute for Health and Care Excellence (NICE) guidance. HTA research is also an important source of evidence for National Screening Committee (NSC) policy decisions.

This article

The research reported in this issue of the journal was funded by the HTA programme as award number NIHR135572. The contractual start date was in May 2018. The draft manuscript began editorial review in November 2022 and was accepted for publication in June 2023. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' manuscript and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this article.

This article presents independent research funded by the National Institute for Health and Care Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, the HTA programme or the Department of Health and Social Care. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, the HTA programme or the Department of Health and Social Care.

This article was published based on current knowledge at the time and date of publication. NIHR is committed to being inclusive and will continually monitor best practice and guidance in relation to terminology and language to ensure that we remain relevant to our stakeholders.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Newgen Digitalworks Pvt Ltd, Chennai, India (www.newgen.co).