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Quality assurance in surgical trials of arteriovenous grafts for haemodialysis: protocol for a systematic review

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ABSTRACT

Introduction Decisions regarding the optimal vascular access for haemodialysis patients are becoming increasingly complex, and the provision of vascular access is open to variations in systems of care as well as surgical experience and practice. Two main surgical options are recognised: arteriovenous fistula and arteriovenous graft (AVG). All recommendations regarding AVG are based on a limited number of randomised controlled trials (RCTs). It is essential that when considering an RCT of a surgical procedure, an appropriate definition of quality assurance (QA) is made for both the new approach and the comparator, otherwise replication of results or implementation into clinical practice may differ from published results. The aim of this systematic review will be to assess the methodological quality of RCT involving AVG, and the QA measures implemented in delivering interventions in these trials.

Methods and analysis The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines will be followed. A systematic search will be performed of the MEDLINE, Embase and Cochrane databases to identify relevant literature. Studies will be selected by title and abstract review, followed by a full-text review using inclusion and exclusion criteria. Data collected will pertain to generic measures of QA, credentialing of investigators, procedural standardisation and performance monitoring. Trial methodology will be compared against a standardised template developed by a multinational, multispecialty review body with experience in vascular access. A narrative approach will be taken to synthesise and report data.

Ethics and dissemination Ethical approval is not required as it is a protocol for a systematic review. Findings will be disseminated through peer-reviewed publications and conference presentations, with the ultimate aim of providing recommendations for future RCT of AVG design.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The methodology of this systematic review will closely follow previous reviews of quality assurance methods performed in surgical oncology.
⇒ This protocol describes a multidisciplinary approach to examining a controversial area of surgery, aiming to ensure objectivity and reflect a wider consensus approach.
⇒ This review will assess randomised controlled trials with widely differing aims and designs, and could be criticised for being overly broad.
⇒ The analysis will take a binary approach to data reporting, which may not equate to the effectiveness of the processes being reported.

INTRODUCTION

Randomised controlled trials (RCTs) in surgery have several important roles beyond informing case selection and assessing the utility of individual procedures—they may also inform the need for technical resources, training and patient pathways. Accordingly, RCT in surgery may impact on, and be impacted by, the organisation and delivery of services.[1] As such, while the impact from surgical RCTs can be wide ranging, the successful delivery of a surgical RCT can thus be vulnerable to healthcare system challenges, interprocedural adaptations as well as the effects of surgeon-specific variation in delivery.[2] Ensuring a standard of treatment in surgical RCTs is therefore of fundamental importance. However, historically, there have been fewer RCT in surgery than in other medical areas, and often with significant methodological flaws.[3]

Much of surgical practice is based on individual belief and personal experience, with potentially widely differing experience in practice and procedures with potential variability in both new techniques under scrutiny and also established procedures used as a comparative benchmark.[4] Thus it is essential that when considering an RCT of a surgical procedure, an appropriate definition of quality assurance (QA)—the planned

and systematic activities implemented in a system so that quality requirements for a product or service will be fulfilled,[5] is made. Without this, replication of results or implementation into clinical practice may differ from published results. The factors encountered in surgical RCT are in stark contrast to the largely fixed regimens seen in pharmaceutical trials, in which compliance and dosing are more relevant variables and more easily measured.[2 6]

In recognition of the difficulties in reproducing outcomes from RCT, a checklist of 33 items for protocol development—the SPIRIT guidance, was developed.[7] Item 11 in the SPIRIT guidance was amended to address the limitations specific to interventions, and later amended to increase its clinical utility. These guidelines may not be directly applicable as they were not specifically designed for surgical or interventional trials.

Trial methodology to ensure QA in surgical trials has largely been based on surgical oncology.[8] This has evolved over the last 20 years largely driven by specific RCT that have been used as a model on which to build a QA method.[9] For example, a trial comparing surgical techniques in oesophageal cancer was used as a model to derive detailed QA measures that included: entry criteria for surgeons; assessment of operative videos; standardisation of operative techniques by establishing minimum key procedures; monitoring of surgeons during the trial using intraoperative photography to document key procedures; and standardising the pathological assessment of specimens.[10]

One area which is open to variation in systems of care, as well as surgical experience and practice is the provision of haemodialysis vascular access.[11 12] Treating kidney failure requires significant healthcare resources, of which the main modifiable cost is vascular access provision.[13] Decisions regarding the optimal vascular access for haemodialysis patients are becoming increasingly complex as the haemodialysis population becomes older and more comorbid, and technical innovations increasing options. There are two main surgical alternatives: arteriovenous fistula (AVF) and arteriovenous graft (AVG), with 20 years of debate regarding the two options. It is well recognised that the patient pathway differs radically between the two: AVF having higher initial failure rates, AVG having higher maintenance requirements. All recommendations regarding AVG are based on a limited number of historical RCT, but with no formal assessment of the methodological quality and QA of the intervention performed.[14 15] This is critical in considering future RCT and how these may be optimally performed.

The aim of this systematic review will be to formally assess the QA employed in all RCT published of AVG based on criteria identified in novel approaches to QA methodology. The ultimate aim being to producing recommendations for a QA framework which can be used in future clinical trial design in vascular access.

METHODS AND ANALYSIS

This systematic review will be conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[16 17]

Objectives

To conduct a comprehensive systematic review of the QA methods that have been employed in the published literature of randomised trials involving AVG.

Review question

This systematic review will address the following research question: What QA methods have been employed from randomised trials involving AVG in the last 30 years to ensure that the data published is of sufficient quality, reliable and reproducible?

Criteria for considering studies

Inclusion criteria

1. RCTs including cluster-randomised trials and quasi-randomised trials, for example, allocation by alternation.
2. Trials involving incident or prevalent haemodialysis patients undergoing surgical intervention to create vascular access for haemodialysis. No other patient demographic factors will be taken into consideration in selecting trials for inclusion.
3. Studies published in English regardless of the country or ethnic background of the study population.
4. Trials relating to the surgical procedure of creation of vascular access involving AVG. Any trial considering the technical aspects of this process will be considered for inclusion, for example, graft type, graft size, intraoperative adaptations and anastomotic techniques, comparing AVG with other vascular access modalities.

Exclusion criteria

1. Studies not involving the surgical procedure of AVG implantation, for example, surveillance, postoperative interventions.
2. Studies not in English.
3. Studies with no availability of the full text.
4. Studies in which the participants are not human.
5. Non-RCTs, case reports, case series, letters, editorials and conference abstracts.
6. Multiple publications of the same data, with the most recent publication to be used.
7. Studies involving other types of vascular access or surgical devices, medical therapies and preprocedural and/or postprocedural interventions, for example, anaesthetic type, exercise, surveillance or treatment, cannulation.

Type of outcome

We will analyse the methodology of trials that report any raw data or statistical outcome related to successful creation and maintenance of arteriovenous haemodialysis access (AVG/AVF patency, the timing and number of complications or interventions).

Information sources and search strategy

A systematic search will be performed on the MEDLINE, Embase and Cochrane databases to identify studies published in English covering the period from January 1990 to December 2022. The search strategy will include keywords to describe RCTs involving AVG for haemodialysis access as the intervention. The Medical Subject Headings terms relating to RCTs, haemodialysis and vascular access will be included in the search (online supplemental file 1). This will be supplemented by a manual search of reference lists from the identified studies, review articles and systematic reviews.

Selection of studies for inclusion

Titles and abstracts identified using the search strategy will be screened independently by two reviewers to identify appropriate studies for eligibility assessment. Reasons for exclusions of studies will be collected during abstract screening. Full text articles of potentially suitable studies will be retrieved and independently assessed for eligibility by the same reviewers. In cases of disagreement, a third reviewer will be consulted.

Data collection and management

There are currently no established tools to assess QA methodology in surgical trials. The review will require detailed subjective assessment of QA data that is derived from the texts. To ensure consistency and objectivity, a three-stage iterative process will be undertaken: phase I: initial scoping review, phase II: an independent multidisciplinary review, phase III: final aggregation and reconciliation with original texts.

Phase I: initial review

Identification of RCT and Structure of QA Data: Initially the original texts will be reviewed with data extracted by two reviewers (DK and BE). Data will include the year of the study, number of patients included, numbers of centres and/or surgeons, and comparators. Specific attention will be paid to the 'Methods' section of each study for

Table 1 Quality assurance indicators

QA category	Data to be extracted
Generic	Is there evidence of multidisciplinary decision-making in recruitment?
	No of centres participating in trial
	Have the authors previously published outcomes in this field?
	Have the authors sought, and obtained, ethical approval for the trial?
	Is funding, or absence of funding, declared and the source(s) specified?
	Has the trial been registered, or has a trial protocol been published?
	Is a CONSORT diagram included in the methodology section?
	Is there reference to published guidelines included in the article?
Credentialing	Is there recording of the surgeons experience in performing the procedure, or evidence of training prior to trial recruitment?
	Is there acknowledgement of, or statistical assessment of the learning curve expected when introducing new surgical techniques?
	Is the average caseload volume of the operating surgeon and/or the recruiting surgical department described?
Standardisation	Has preoperative assessment of vascular anatomy been performed, and is the method described?
	Is there evidence of standardisation in operative techniques in both the intervention and control groups?
	Is there evidence of standardisation in the postoperative management of patients?
	Is there a defined programme of graft surveillance and is adherence to it defined?
	Are the outcome measures and trial end-points clearly defined?
	Is there a uniform approach to the reporting and management of complications?
Monitoring	Is there a detailed method of assessing adherence to the trial protocol?
	Has photographic or videographic monitoring been considered or utilised?
	Are indicators for surgical decision-making recorded if trial protocol is breached?
	Is there evidence of regular audit of trial outcomes including clinical outcome measures?
	Are surgical details captured on standardised collection forms?

CONSORT, Consolidated standards for reporting trials.

data pertaining to generic measures of QA, credentialing of investigators, procedural standardisation and performance monitoring (table 1).[8 18–21] A specific word search of each RCT will be performed searching for relevant terms (published, publications, workload, previous, prior, case/s, caseload, workload). A standardised template will then be developed based on a previous structured approach and specific measures of relevance to vascular access surgery.

Phase II: multidisciplinary appraisal of QA methods

To ensure that a variety of opinion and expertise is represented, a diverse body of reviewers with experience in vascular access will consider QA methodology. This body will reflect a diversity of professional experience (surgery, radiology, nephrology and nursing), of geography (Spain, Italy, England, Wales, Scotland, Greece), of centre size (large and small units), and location (urban and rural). A meeting of the review body will be held, at which participants will consider the relevant QA for each specialty. Following this consensus meeting, each reviewer will independently review five separate RCT using the standardised template. Each RCT with, therefore, has a minimum of three reviews performed independently.

Phase III: reconciliation

The cumulative data will then be aggregated, reconciled and areas of disagreement resolved through reference to the original texts by two reviewers (BE/DK).

In total, each article will be reviewed by a minimum of three reviewers independently.

Appraisal methods

QA methods will be sought in in four areas (generic, credentialing, standardisation and monitoring) as described previously.[8 18–21] Within each of these domains, information will be sought and classified as present or absent.

Generic: Funding source, ethical approvals, CONSORT diagram (consolidated standards for reporting trials), published protocol.

Credentialing: To establish the qualifications—knowledge, skill or performance, previous technical experience, previous publication experience, training.

Standardisation: A clear outline of interventions and prerequisite steps; pretrial training; standardisation of approach.

Monitoring: Clear definitions of outcomes, definition of management of complications, recording markers of quality, audit.

Outcomes and prioritisation

The outcome of interest is the methods employed to ensure and assess QA, with the ultimate aim of providing recommendations for future RCT of AVG design.

Data synthesis

We will take a narrative approach to synthesising data, providing detailed written commentary on the data extracted in accordance with the categories described in table 1. This will provide insight into the prevalence of QA methodology in the available evidence base for vascular access surgery.

Patient and public involvement

No patients or members of the public were involved in the design of this study.

ETHICS AND DISSEMINATION

Ethical approval is not required as it is a protocol for a systematic review. Findings will be disseminated through peer-reviewed publications and conference presentations, with the ultimate aim of providing recommendations for future RCT of AVG design.

DISCUSSION

Although RCTs remain the best level of evidence in surgery, variability in the delivery of an intervention may call into question the validity of results unless there is adoption of basic QA methodology. There is an increasing recognition that QA in surgical RCT presents challenges through variation in surgical practice, professional beliefs and experience. This may result in significant variability in outcomes between procedures that may relate to trial design rather than true effect. Establishing quality assured practice in RCTs is essential to optimise treatment decision. Without this, there is the potential for a self-perpetuating cycle of low quality evidence influencing practice, that in turn may limit the perceived need for further RCTs. This is particularly important in areas of contention, when technological advances occur or where there is limited experience allied to strong personal belief. Vascular access for haemodialysis is one such area.

There has been a 20-year debate about the role of AVG compared with AVF, based on six RCT directly comparing two modalities.[22–27] This topic has received increased attention due to both increased recognition of the success of alternatives, and the costs of failed vascular access procedures.[28] Additionally, innovations in AVG design now allow cannulation within a few hours rather than waiting for 2 weeks, and thus remove the need for a central-venous catheter in patients who require vascular access for haemodialysis to be commenced or continued.[22] Determining the role of 'early-cannulation' AVG is the subject of current scrutiny, particularly in the elderly or where AVF maturation is uncertain.[29] This systematic review aims to appraise the quality of the existing evidence base, and will produce recommendations for potential improvements in QA methodology for future RCTs in AVG.

The methodology of this review follows closely previous reviews of QA methods performed in surgical oncology. QA in these studies has differentiated between several areas including generic areas, credentialing, standardisation of procedure and monitoring of outcomes. As this

is the first such approach taken in vascular access in a particularly controversial area, we have adopted a multidisciplinary approach to ensure objectivity. The concept of a meeting to discuss and refine an approach, and agree standards is novel and incorporates relevant specialities, interest groups and differing practises. This will increase the probability that RCT outcomes are reflective of a wider consensus approach rather than an individual's perceptions. By breaking QA into the component parts, we aim to review the published evidence to bring together the best aggregate approach in each of these areas to help inform future protocols of RCT into AVG.

This proposal has several potential weaknesses. First, it will be based entirely on the published RCT, and as such, it assumes that omission of details equates to the processes not being performed, which may not be the case. Second, this analysis could be criticised for being both overly broad (in including widely differing RCT aims and designs) and reflecting historical practice (extending over a 30-year time period with vastly changing population and devices). However, many of these publications are quoted in multiple guidelines and thus influence contemporary practice. Third, much of the data to be reported may not have evidence of direct effect, and may therefore not be necessary. Fourth, the binary approach taken (presence or absence of reporting) does not equate to the effectiveness of the processes to be reported. However, the processes to be measured are indicative of a general approach without which comparison of outcomes is difficult and hard to reproduce in practice.

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