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IN DEVELOPMENT

Pre-Operative Ultrasound Mapping Before Arteriovenous Fistula creation: An updated Systematic Review and Meta-Analysis

COMMENTS 0

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ABSTRACT

Arteriovenous fistulas remain the gold standard of vascular accesses in haemodialysis; however, the routine use of pre-operative ultrasound for vascular mapping still remains controversial. This meta analysis aims to shed some light into the reliability of routine preoperative Doppler ultrasound versus isolated physical examination of autologous arteriovenous fistulas in improvement of successful usage of AVF. A systematic review and meta-analysis according to the PRISMA guidelines will be performed for eligible studies including patients who underwent routine ultrasound mapping before arteriovenous fistula formation. A random-effects model using restricted maximum likelihood will be fitted in order to provide pooled estimates of odds ratios and 95% confidence intervals.

PROTOCOL CITATION

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Abstract

1 Background

Arteriovenous fistulas remain the gold standard of vascular accesses in haemodialysis; however, the routine use of pre-operative ultrasound for vascular mapping still remains controversial. This meta analysis aims to

shed some light into the reliability of routine preoperative Doppler ultrasound versus isolated physical examination of autologous arteriovenous fistulas in improvement of successful usage of AVF.

2 Study design

The meta-analysis will be conducted in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

3 Search strategy

This systematic review was performed according to the updated Preferred Reporting Items for Systematic reviews and Meta-Analyses statement (PRISMA) and submitted to PROSPERO for registration. The study period included PubMed literature searches Cochrane Library, ClinicalTrials.gov from inception until November 1, 2022 with the following terms for the electronic search: *((venous mapping) OR (vessel mapping) OR ultrasound OR pocus OR sonography OR (point-of-care-ultrasound) OR Doppler OR "Ultrasonography"[Mesh]) AND (dialysis OR hemodialysis OR "Renal Dialysis"[Mesh]) AND (fistula OR arteriovenous fistula OR AVF vascular access OR "Fistula"[Mesh])*" Systematic searches were conducted by two independent investigators, blind to each other, and any discrepancies were resolved by consensus between them.

4 Eligibility criteria Population

Randomized controlled trials (RCT), retrospective, cross-sectional, or prospective observational studies from any country on any language including patients undergoing primary AVF formation assigned to preoperative evaluation. Studies should report on a cohort of adult patients (>18 years) evaluated pre-operatively with selective US or only with clinical examination use and a cohort evaluated pre-operatively with routine DUS mapping before the creation of an AVF. Post operative outcomes including succesful usage of fistula for dialysis should be reported.

5 Study selection

All record results retrieved from the systematic search of electronic libraries were imported into Rayyan and duplicates were manually removed. Titles, abstracts and keywords of all the articles were screened by two independent reviewers and irrelevant reports were removed. Full text screening of the selected articles was performed by the two same reviewers. Each disagreement was resolved through discussion and consultation with the other authors.

6 Data extraction

A data extraction form was created to extract the following characteristics: Author, Year, Country, Study Type, Arterial and/or Venous Mapping Pre-Op US criteria, Fistula used for dialysis with Ultrasound, Fistula succesfully used for dialysis with Physical Examination Only, Statistically Significant Ultrasound Parameters, DUS Criteria, Outcome Follow Up, Success Rate, Failure Rate, Maturation Rate, Primary Patency, Primary-Assisted Patency, Secondary Patency. This form was evaluated for suitability in two randomly selected studies by all study's authors. After finalizing the form, two of the authors independently extracted the data from each study.

7 Quality assessment

The risk of bias for all included studies will be assessed using the Risk Of Bias In Non-Randomized Studies - of Interventions (ROBINS-I) for observational studies and revised Cochrane risk-of-bias tool for randomized trials (RoB-2 CRT). This will be graphically displayed in using the ROBVIS (Risk-Of-Bias VISualization) tool.

8 Data analysis

Analyses for each endpoint were separately performed based on random effects, using odds ratios (ORs) as

effect size. Inverse variance weights were used in all cases. I^2statistics were used to assess the heterogeneity across the studies. I^2>75% indicated high heterogeneity. Additionally, the cumulative incidence of endpoints and the corresponding 95% confidence intervals (CI) were estimated. Forest plots were used to graphically display the effect size in each study and the pooled estimates. Funnel plots and Egger regression tests were used to assess publication bias. Statistical analyses were conducted using R-Studio and RevMan software.