The use of mobile technology to augment exercise therapy for intermittent claudication

Mahim Qureshi[1], Samantha Greenfield[2], Kaji Sritharan[3]
[1]Royal Free Hospital, London [2]London Northwest Hospitals NHS Trust, London [3]Royal Liverpool University Hospital, Liverpool

Background

Supervised exercise therapy is advocated by international guidelines as first-line treatment for intermittent claudication. Such programmes are costly, limited in availability, or precluded by patient factors such as comorbidities and motivation. Mobile technology (such as an activity monitor) may augment home exercise to serve as a beneficial substitute to supervised exercise. The aim of this review was to determine whether mobile technology improved exercise performance of patients with intermittent claudication.

Methods

A systematic review adherent to PRISMA guidelines was performed. Medline and EMBASE databases were searched using the OVID portal. Randomised controlled trials (RCTs) incorporating the use of mobile technology to augment exercise therapy for patients with arterial claudication were included.

Results

Five RCTs were included for analysis. All studies compared mobile technology with standard care, and 3 studies additionally compared the use of mobile technology with supervised exercise. The heterogeneity of reported outcome measures prohibited quantitative analysis. Mobile technology improved maximum walking distance, claudication onset time, and claudication distance when compared to standard care. Supervised exercise was found to improve peak walking time, however walking cadence improved preferentially with the use of mobile technology and home-based exercise. Limitations include small study sizes, lack of powered studies, and self-selection bias.

Conclusion

There is evidence to suggest that the use of mobile technology may serve as a feasible substitute to supervised exercise, but only one RCT confirms this finding with sufficient power. Consistent reporting of outcome measures is required to synthesise Level Ia evidence.

Atherectomy for peripheral arterial disease

Bethany Wardle[1], Graeme Ambler[1,2], Robert Hinchliffe[1,2], Christopher Twine[1,2]
[1]North Bristol Trust, Bristol [2]University of Bristol, Bristol

Background

The aim was to evaluate the effectiveness of atherectomy compared to other established treatments for symptomatic peripheral arterial disease (PAD). This is important given its global use as a revascularisation option.

Methods

A systematic review and meta-analysis was performed in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. The Cochrane Central Register of Controlled Trials (CENTRAL) and the Cochrane Peripheral Vascular Diseases Specialised Register were searched from inception until August 2018 for randomised controlled trials. Random effects models were used for meta-analysis.

Results

Seven trials were included comparing atherectomy vs. balloon angioplasty (BA) +/- primary stenting. Trials were of poor quality, with significant risk of bias due to inadequate blinding and small size. Six trials compared atherectomy vs. BA, including 372 patients. Atherectomy was found to be associated with significantly lower rates of bailout stenting (RR 0.26 [0.09,0.74], P=0.01), dissection (RR 0.28 [0.14,0.54], P=0.0001) and lower balloon inflation pressures (Mean difference -3.68atm [-5.36,-2.01], P<0.0001). No significant differences were found for technical failure rates, patency, target vessel revascularisation, mortality, amputation, distal embolization or complication rates.

Conclusion

This review has identified poor quality evidence to support atherectomy as an alternative to BA. Although atherectomy reduced dissection, bailout stenting rates and balloon pressures, no difference was found in primary patency or revascularisation rates at any time. Given the clear evidence base and established gold standard guidelines for BA, atherectomy has no clear place in the routine treatment of patients with PAD who are amenable to standard BA.

Preoperative cardiac stress testing in patients undergoing vascular surgery: preliminary results of a systematic review

Sarah Nduwayo[1], John Houghton[1], Andrew Nickinson[1], Coral Pepper[2], Tanya Payne[1], Greg McMahon[1,3], Matt Bown[1,3], Gerry McCann[1], Rob Sayers[1,3]

[1]Cardiovascular Sciences, University of Leicester, Leicester [2]Library Service, University Hospitals of Leicester NHS Trust, Leicester [3]Leicester Vascular Institute, University Hospitals of Leicester NHS Trust, Leicester

Introduction

Coronary artery disease (CAD) is a major cause of perioperative morbidity and mortality in patients undergoing vascular surgery. Several tests have been used to assess risk of postoperative cardiac complications. In this systematic review we compared the prognostic accuracy of preoperative cardiac stress tests in predicting postoperative cardiac events in patients undergoing vascular surgery.

Methods

A search of Medline, Embase, Scopus, CINAHL and the Cochrane library databases was conducted to identify studies correlating postoperative cardiac events of patients undergoing vascular surgery to preoperative cardiac stress tests between 1998 and 2018. Sensitivity and specificity were calculated from published results. Summary receiver operator characteristic (SROC) curve and forest plots were used to compare different tests.

Results

A total of 17 studies (3182 patients) were included. The mean age was 67±3 years and 82% were male. Twelve studies (71%) were prospective and 13 (76%) had a Newcastle-Ottawa scale score ≥7. Seven studies used stress echocardiography (SE), 8 myocardial perfusion imaging (MPI) and 2 studies compared SE and MPI. With regards to predicting postoperative cardiac events, MPI and SE had a sensitivity of 70% (95% confidence interval [CI] 44% to 83%) and 49% (95% CI 32% to 70%) respectively whilst specificity was 60% (95% CI 45% to 79%) and 85% (95% CI 74% to 87%) respectively.

Conclusion

Overall prognostic accuracy of cardiac stress tests for postoperative cardiac events after vascular surgery remains modest. Further research is required in vascular surgery patients using newer techniques and modalities that have been shown to have higher diagnostic accuracy of predicting CAD.

Screening for popliteal artery aneurysms in patients undergoing non-elective abdominal aortic aneurysms interventions: Is it worthwhile?

Andrew Khallaf, Shady Zaki, Monica Boughdady, Hussien Rabee, Ragai Makar
Countess of Chester NHS Foundation Trust, Chester

Background

It is difficult to determine the prevalence of popliteal artery aneurysms (PAA) but they appear to coincide with abdominal aortic aneurysms (AAA) affecting more men than women[1,2]. The overall prevalence is 19%[1] while the incidence in men with AAA is 14%[2]. There is a controversy about screening patients presenting with AAA for PAA. While some publications recommend at least one radiological examination due to the poor sensitivity of clinical examination[1,2], others recommend against it as part of the community-based AAA screening. They found PAA screening of limited value and not cost effective[3,4].

Methods

We retrospectively identified patients who survived any non-elective aortic intervention between January 2014 and December 2018. Electronic medical records were reviewed to identify patients who had an ultrasound or computed tomography angiogram (CTA) for PAA.

Results

102 patients underwent non-elective vascular interventions among which 69 survived and were discharged for follow-up. A radiological examination was performed during the acute admission or on follow-up in 39% (n=27). Ultrasound was performed in 28% (n=19) and CTA in 12% (n=8). PAA was detected in 7% of the scanned group (n=2), one was detected by ultrasound and the other by CTA. The latter had a major amputation after presenting acutely with a thrombosed PAA and failed thrombolysis. The patient detected by duplex is undergoing surveillance for bilateral PAAs. 32 patients (76%) of the un-scanned group are still alive.

Conclusions

Screening for PAA is inadequate in patients undergoing non-elective AAA interventions but worthwhile to avoid a preventable cause of major amputation.

An audit of hybrid reconstruction of the iliofemoral segment

Caitlin MacLeod, Morven Allan, Stuart Suttie, Murray Flett, Graeme Guthrie
Ninewells Hospital, Dundee

Background

Increasingly iliofemoral disease is treated with open reconstruction of the femoral artery with common femoral endarterectomy (CFAE) and bifurcation and an endovascular inflow procedure. In our institution we adopt a stent-low, patch high approach to the reconstruction of the iliofemoral segment, which we believe should give the optimal outcome. The aim of the current study was to assess patency and survival in our cohort of patients undergoing iliofemoral reconstruction.

Methods

A retrospective study of patients undergoing iliofemoral reconstruction using the hospital vascular lab database, hospital clinical portal, and national PACS systems.

Results

34 patients were included, 8 female and 26 male, average age 66 years. 31 patients underwent a unilateral procedure, while 4 had bilateral treatment. The majority of lesions were TASC C/D lesions. The average length of stay was 14 days. 1 patient underwent minor amputation, while 3 required major lower limb amputation. 8 patients were deceased at the censor date. ASA grade was 2 in 16 patients, 3 in 16 patients, and 4 in 3 patients. Adverse events included iliac rupture (n=2), trashing requiring intervention (n=1), groin seromas (n=2), and groin infection (n=1). Common femoral reconstruction (CFAE) and iliac stents were patent in all patients on post-procedure duplex. All stents and CFAE were patent at 6-week follow-up duplex except one patient who had a non-significant stenosis at the EIA/CFA junction.

Conclusions

This audit of our results of iliofemoral reconstruction demonstrates the safety and efficacy of the hybrid approach.

Outcomes for patients turned down for treatment following detection of aneurysms by the National Abdominal Aortic Aneurysm Screening Programme

Katherine Stenson, Peter Holt, Ian Loftus
St George's Vascular Institute, London

Background

The National Abdominal Aortic Aneurysm Screening Programme (NAAASP) commenced in England in 2009 and completed implementation in 2013; its aim being to reduce the rate of death due to ruptured aneurysm in men. Little has been published regarding the outcomes for patients who do not receive immediate treatment for their aneurysm.

Methods

Patients who were diagnosed with AAA greater than 55 mm through the NAAASP but did not undergo immediate surgery for any reason, were identified from prospectively-kept records held by the local screening programme. Details regarding further outpatient encounters and further surveillance were gained from hospital case notes and online records. Pre-, peri- and postoperative details were collected for those patients who did proceed to surgery.

Results

Since 2010, 118 men have had screen-detected aneurysms. 14 (11.9%) of these did not undergo immediate surgery according to the guidelines set out by the NAAASP. 6 men were turned down completely due to serious cardiorespiratory comorbidity and poor physiological fitness. 6 men were given a higher threshold diameter before consideration of surgery following assessment of fitness. 1 patient refused surgery and the other chose to defer surgery. 4/14 patients (28.6%) eventually underwent endovascular aneurysm repair and all remain alive. 1 patient died following a ruptured aneurysm. There have been 6 deaths from other causes. Survival estimates are 69.8% at 1 year and 42.0% at 3 years following referral from the NAAASP.

Conclusion

These results show a relatively low “turndown” rate, with appropriate selection of patients who are not fit to undergo AAA repair.

Prognostic review and time-to-event data meta-analysis of endovascular aneurysm repair outside versus within instructions for use of aortic endograft devices

Assad Khan[1], George Antoniou[1,2], Maciej Juszczak[3], Ranjeet Narlawar[4], Stavros Antoniou[5], Miltos Matsagkas[6], Konstantinos Donas[7], Jean-Paul de Vries[8]

[1]Department of Vascular and Endovascular Surgery, Royal Oldham Hospital, Oldham [2]Division of Cardiovascular Sciences, School of Medicine, University of Manchester, Manchester [3]Birmingham Complex Aortic Team, University Hospitals of Birmingham, Birmingham. [4]Department of Radiology, Royal Oldham Hospital, Oldham [5]Department of Surgery, School of Medicine, European University Cyprus, Nicosia, Cyprus [6]Department of Vascular Surgery, Faculty of Medicine, School of Health Sciences, University of Thessaly, Larissa, Greece [7]Department of Vascular Surgery, St Franziskus Hospital, Münster, Germany [8]Department of Surgery, Division of Vascular Surgery, University Medical Centre Groningen, Groningen, Netherlands

Objectives

To investigate whether patients undergoing standard endovascular aneurysm repair (EVAR) outside the instructions for use (IFU) have worse outcomes than patients treated within IFU.

Review methods

We conducted a systematic review according to the PRISMA guidelines. Pooled estimates of dichotomous outcomes were calculated using odds ratio (OR) or risk difference (RD) and 95% confidence interval (CI). We conducted a time-to-event data meta-analysis. We formed meta-regression models to explore heterogeneity as a result of changes in practice over time.

Results

We identified 17 observational cohort studies reporting a total of 4,498 patients. The pooled prevalence of EVAR performed outside the IFU was 40% (95% CI 33-48). Non-adherence to IFU was not associated with increased risk of perioperative mortality (RD 0.01, 95% CI -0.00-0.01; P=0.23), aneurysm rupture (HR 1.34, 95% CI 0.30-5.93; P=0.70), aneurysm-related mortality (HR 0.88, 95% CI 0.20-3.84; P=0.86), technical failure (RD 0.01, 95% CI -0.03-0.05; P=0.56), requirement for adjunctive procedures (OR 1.48, 95% CI 0.81-2.71; P=0.20), type I endoleak (HR 2.28, 95% CI 0.58-8.91; P=0.24), aneurysm sac expansion (HR 0.86, 95% CI 0.55-1.33; P=0.49), or aneurysm-related reintervention (HR 1.04, 95% CI 0.81-1.34; P=0.74). The overall mortality was significantly higher in patients treated outside the IFU (HR 1.20, 95% CI 1.02-1.42; P=0.03). Meta-regression showed that the prevalence of EVAR performed outside the IFU has increased over time (P=0.019).

Conclusions

Standard EVAR outside the IFU can be considered in carefully selected patients who are deemed high risk for complex open or endovascular surgery.

Effect of low skeletal muscle mass on post-operative survival of patients with abdominal aortic aneurysm: A prognostic factor review and meta-analysis of time-to-event data

Assad Khan[1], George Antoniou[1,2], Djamila Rojoa[1], Stavros Antoniou[3], Aws Al-Fahad[4], Francesco Torella[5], Maciej Juszczak[6]

[1]Department of Vascular & Endovascular Surgery, The Royal Oldham Hospital, Manchester [2]Division of Cardiovascular Sciences, School of Medical Sciences, University of Manchester, Manchester, [3]Department of Surgery, School of Medicine, European University Cyprus, Nicosia, Cyprus. [4]Department of Radiology, Royal Oldham Hospital, Oldham, [5]Liverpool Vascular and Endovascular Service, Liverpool [6]Birmingham Complex Aortic Team, University Hospitals of Birmingham, Birmingham

Background

Low psoas muscle mass is associated with increased mortality and morbidity after surgery. We aim to investigate the prognostic role of low skeletal muscle mass in survival of patients with AAA undergoing open or endovascular aneurysm repair (EVAR).

Methods

The study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (registration number: CRD42018107793). We performed a time-to-event data meta-analysis for all-cause mortality and reported the results as summary hazard ratio (HR) and 95% confidence interval (CI). Peri-operative outcome data was calculated using odds ratio (OR) or risk difference (RD) and 95% CI.

Results

Seven observational cohort studies reporting a total of 1440 patients were eligible. Patients with low skeletal muscle mass had a significantly higher hazard of mortality than those without low skeletal muscle mass (HR 1.66, 95% CI 1.15 – 2.40, P=0.007). Subgroup analysis of EVAR only patients showed a marginal survival benefit for patients without low skeletal muscle mass (HR 1.86, 95% CI 1.00 – 3.43, P=0.05). Meta-analysis of two studies found no significant difference in peri-operative mortality (RD 0.04, 95% CI -0.13 – 0.21) and morbidity (OR 1.58, 95% CI 0.90 – 2.76, P=0.11) between patients with and without low skeletal muscle mass.

Conclusions

There is a significant link between low skeletal muscle mass and mortality in patients undergoing AAA repair. Prospective studies validating the use of body composition for risk prediction after aortic surgery are required before this tool can be used to support decision making and patient selection.

Large diameter aortic neck in endovascular aneurysm repair: A prognostic factor review and meta-analysis of time-to-event data

Kerry Burke[1], George Antoniou[1,2]

[1]Department of Vascular & Endovascular Surgery, The Royal Oldham Hospital, Manchester [2]Division of Cardiovascular Sciences, School of Medical Sciences, University of Manchester, Manchester

Background

Adverse morphological features of the proximal aortic neck have been identified as culprits for late failure after endovascular aneurysm repair (EVAR). We investigated the prognostic role of wide proximal aortic neck in EVAR.

Methods

We conducted a review of the literature in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (registration number: CRD42018114288). The prognostic factor of interest was large diameter proximal aortic neck. We performed a meta-analysis of demographics, clinical and anatomic characteristics in patients with large versus those with small diameter aortic neck and reported the results as odds ratio (OR) or mean difference (MD) and 95% confidence interval (CI). We performed a time-to-event data meta-analysis for late outcomes using the inverse-variance method and reported the results as summary hazard ratio (HR) and 95% CI. We applied random-effects models of meta-analysis.

Results

We identified 6 observational studies reporting on a total of 6,602 patients (1,616 with large diameter and 4,986 with small diameter neck). Patients with large proximal aortic neck were older (MD 0.87, 95% CI 0.35-1.39; P=0.001). The prevalence of male gender (OR 1.63, 95% CI 1.34-1.98; P<0.001), coronary artery disease (OR 1.20, 95% CI 1.06-1.36; P=0.004), chronic obstructive pulmonary disease (OR 1.18, 95% CI 1.03-1.36; P=0.02) and chronic kidney disease (OR 1.43, 95% CI 1.23-1.66; P<0.001) was higher in the wide neck group. Patients with large diameter proximal neck had shorter proximal neck (MD -1.91, 95% CI -2.04--1.77; P<0.001) and a larger aneurysm diameter compared to those with small diameter neck (MD 3.40, 95% CI 2.71-4.10; P<0.001). Patients with small diameter proximal neck had significantly higher freedom from aneurysm-related reintervention (HR 2.06, 95% CI 1.23-3.45; P=0.006), freedom from type Ia endoleak (HR 6.69, 95% CI 4.39-10.20; P<0.001), freedom from sac expansion (HR 10.07, 95% CI 1.80-56.53; P=0.009), freedom from aneurysm rupture (HR 5.10, 95% CI 1.40-18.58; P=0.01), and survival (HR 1.55, 95% CI 1.08-2.24; P=0.02).

Conclusions

Patients with a wide proximal aortic neck undergoing standard EVAR were found to have poorer outcomes. Increased vigilance for aneurysm-related complications with closer surveillance should be considered in patients with wide proximal neck.

Persistent Type II Endoleaks – Does thrombus burden matter?

J Nicholls, EN Kirkham, P Ireland, L Haslam, S Paravastu, SR Kulkarni
Cheltenham General Hospital, Cheltenham

Background

Persistent Type II Endoleaks (PE) have necessitated prolonged surveillance following endovascular aneurysm repair (EVAR). We hypothesised that percentage of thrombus (PT) within the aneurysmal sac predicts PE.

Methods

Consecutive EVARs from January 2015 to December 2017 were analysed. PT was assessed on preoperative CT angiogram (CTA), defined as "percentage of thrombus across the maximal sac diameter". Luminal diameter was measured orthogonally at the same level to determine PT. Inferior mesenteric artery and lumbar artery patency were also recorded. Patients were categorised into 2 groups; Group 1 (<25% PT) and Group 2 (>25% PT). Follow-up imaging (duplex and CTA) were assessed for PE (Endoleak >1 year post-procedure).

Results

Some 98 EVARs were performed with median follow-up of 23 months (0-48); Group 1(N=38) and Group 2 (N=60). There were no significant differences between the groups respectively for mean age (76 *vs.* 78 years); gender (male 30/38 *vs.* 55/60) and mean preoperative sac diameter (62mm *vs.* 65mm). PE occurred more frequently in Group 1 compared to Group 2 [36% (n/N=14/38) *vs.* 15% (n/N=9/60) respectively (*p=0.015*)]. A significantly higher number of patent vessels were identified in Group 1 compared to Group 2 [(6 *vs.* 4.9) *p=0.01*)]. Sac size reduction was greater in Group 2; 6% *vs*. 2% (*p=ns*). There was no significant difference in re-intervention rates between groups (1/38 *vs*. 1/60; *p=ns*).

Conclusion

Less than 25% thrombus is associated with increased incidence of PE. Pre-emptive treatment could be considered in these patients whilst those with higher PT could be offered less frequent surveillance.