Surveillance strategies according to the rate of growth of small abdominal aortic aneurysms

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Abstract

The management of small abdominal aortic aneurysms (AAA) is by ultrasound surveillance. The study aimed to calculate their growth rate, identify risk factors and determine appropriate screening intervals. The local screening programme and hospital records were used to identify patients with a small (< 5.5 cm) AAA. The dates and maximum diameter of serial scans of patients with two or more scans were obtained. Patients were subdivided by 0.5 cm increments above 3.0 cm. The rate of growth was calculated by linear regression for each patient using both the absolute measurements and logarithmically (ln) transformed measurements. The 95th centile of growth rate within each subgroup was used to estimate the minimum time to grow to 5.5 cm. A total of 252 were included. The mean (± SD) AAA size on the initial scan was 3.9 (± 0.7) cm. Statin use and initial size were predictive factors for the growth rate. The median rate of growth increased according to size from 0.075 to 0.432 cm/year for AAA < 3.5 cm and > 5.0 cm, respectively. It also steadily increased for ln measurements from 0.022 (or 2.2%/year) to 0.078 or (7.8%/year). The minimum time (months) to reach 5.5 cm was 61, 17, 11 and 5 for AAA < 3.5 cm, 3.5–3.9 cm, 4.0–4.4 cm and 4.5–4.9 cm, respectively. Based on ln measurements, the times were similar at 60, 17, 10 and 4 months. In conclusion, the rate of growth increased steadily with AAA size. An aneurysm < 3.5 cm does not require a repeat scan for 5 years, while those measuri

Prospective intraindividual comparison of unenhanced magnetic resonance imaging vs contrast-enhanced computed tomography for the planning of endovascular abdominal aortic aneurysm repair

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- Abstract
- Full Text
- PDF
- Images
- References

Objective

This study clarified whether unenhanced magnetic resonance imaging (MRI) is an alternative to contrast-enhanced computed tomography (CT) for aortoiliac arterial measurement before endovascular abdominal aortic aneurysm repair (EVAR).

Methods

The institutional review board approved this prospective study. Twenty patients being considered for EVAR underwent MRI using a steady-state free-precession sequence in a 1.5-T system and contrast-enhanced CT within 4 weeks of each other. Two independent observers reviewed MRI and CT in random order using vessel analysis software and measured seven diameters, four lengths, and the angle of the aortoiliac arteries. The intermodality, interobserver, and intraobserver agreements were assessed for each measurement by intraclass correlation coefficients (ICCs) and the Altman-Bland method. Additionally, the observers independently recorded the number of bilateral renal arteries, decided EVAR suitability, and selected the main endograft on each modality.

Results

Intermodality ICCs for observers A and B showed ranges of 0.83 to 0.99 and 0.70 to 0.98; interobserver ICCs for MRI and CT showed ranges of 0.73 to 0.99 and 0.65 to 0.99; and intraobserver ICCs for MRI and CT showed ranges of 0.59 to 0.99 and 0.59 to 0.99. In intermodality, interobserver, and intraobserver comparisons, mean differences in diameters were included within the range −1 to +1 mm, excluding three of seven diameters on CT in interobserver comparison and one of seven on CT in intraobserver comparison. Mean differences in lengths were included within the range −5 to +5 mm, excluding one of four lengths in observer B in intermodality comparison and one of four on MRI and CT in interobserver comparison. All mean differences in angles were included within the range −5° to +5°. Both observers detected all 40 bilateral main renal arteries on MRI and CT. Of the 13 accessory renal arteries, observers A and B detected four (31%) and nine (69%), respectively, on MRI; in contrast, both observers detected 11 (85%) on CT. The observers independently determined that the same seven patients were suitable for EVAR on MRI and CT. Of the seven selected main endografts, seven and six diameters and five and six lengths agreed exactly between MRI and CT for observers A and B, respectively.

Conclusions

Although contrast-enhanced CT remains the gold standard for preoperative EVAR planning, unenhanced MRI with steady-state free-precession sequence can be an alternative modality for patients with contraindications for CT, such as renal impairment, because the intermodality agreement for preoperative measurements is as good as interobserver and intraobserver agreement.

Background

Duplex velocity criteria (DVC) to identify in-stent celiac artery (CA) and superior mesenteric artery (SMA) stenosis is not well defined. Only one study has been published which concluded that DVC for native SMA stenosis overestimated stenosis in stented SMAs. The purpose of this study was to analyze DVC in detecting CA/SMA in-stent stenosis (ISS).

Methods

Forty-three patients with 62 stents (32 SMAs and 30 CAs), who had concurrent postoperative duplex ultrasound scan and angiograms for significant ISS by DVC were analyzed. A receiver operator curve (ROC) analysis was used to determine optimal DVC (peak systolic velocity [PSV], end-diastolic velocity [EDV], and CA or SMA/aortic systolic ratios) for detecting ≥50% and ≥70% ISS. These were compared to duplex velocities obtained from 97 native CAs and 74 native SMAs with ≥50% stenosis done in the same study period.

Results

The mean stented celiac PSV (cm/s), EDV, and systolic ratio for ≥50% ISS were 447, 136, and 7.1 vs 379, 104, and 5.2 for ≥50% native stenosis (P = .067, .106, and < .01). The mean stented

SMA PSV, EDV, and ratio for ≥50% ISS were 410, 114, and 6.2 vs 405, 76, and 2.0 for ≥50% native stenosis (P = .885, .037, and < .0001). The PSV cutpoints for detecting ≥50% SMA ISS was 325 cm/s (sensitivity 89%, specificity 100%, and overall accuracy 91%) vs 295 cm/s for ≥50% native SMA and for ≥70% SMA ISS was 412 (sensitivity 100%, specificity 95%, and overall accuracy 97%) vs 400 for native stenosis. The PSV cutpoints for ≥50% CA ISS was 274 cm/s (sensitivity 96%, specificity 86%, and overall accuracy 93%) vs 240 cm/s for ≥50% native stenosis and for ≥70% CA ISS was 363 (sensitivity 88%, specificity 92%, and overall accuracy 90%) vs 320 cm/s for native stenosis (sensitivity 80, specificity 89%, and overall accuracy 85%). ROC analysis also showed that both PSVs and EDVs were equal predictors for SMA and CA ≥50% and ≥70% ISS. For ≥50% SMA ISS, the area under the curve (AUC) for PSV equals 0.91, EDV = 0.81, P = .341. For CA, PSV, AUC = 0.99, EDV = 0.88, P = .063.

Conclusions

There is a tendency toward higher velocities in stented CA/SMAs in comparison to native arteries. Caution must be exercised in using duplex velocity cutoffs for native CA/SMA stenosis for stented CA/SMA. Further prospective validation studies are needed.

Minimizing radiation exposure to the vascular surgeon

Presented at the 2011 Vascular Annual Meeting of the Society for Vascular Surgery, Chicago, Ill, June 16-18, 2011.

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- Abstract
- Full Text
- PDF
- Images
- References

Objectives

To determine radiation exposure for members of an endovascular surgery team during imaging procedures by varying technique.

Methods

Digital subtraction angiography imaging of the abdomen and pelvis (Innova 4100; GE, Fairfield, Conn) was performed on cadavers, varying positioning and technique within the usual bounds of clinical practice. Radiation exposure was monitored in real-time with dosimeters (DoseAware; Philips, Andover, Mass) to simulate the position of the operator, assistant, and anesthesiologist. The DoseAware system reports radiation exposure in 1-second intervals. Three to five consecutive data points were collected for each imaging configuration.

Results

Operator radiation exposure is minimized with detector-to-patient distance <5 cm (2.1 mSv/h) in contrast to 10 to 15 cm (2.8 mSv/h); source-to-image distance of <15 cm (2.3 mSv/h) in contrast to 25 cm (3.3 mSv/h). Increasing image magnification from 0 (2.3 mSv/h) to 3 (0.83 mSv/h) decreases operator exposure by 74%. Increasing linear image collimation from 0 (2.3 mSv/h) to 10 cm (0.30 mSv/h) decreases operator exposure by 87%. The anesthesiologist's radiation

exposure is 11% to 49% of the operator's, greatest in the left anterior oblique (LAO) 90 degree projection. The assistant's radiation exposure is 23% to 46% of the operator's. The highest exposure to the operator was noted to be in the LAO 90 degree projection (30.3 mSv/h) and lowest exposure with 10-cm vertical collimation (0.28 mSv/h).

Conclusions

Varying imaging techniques results in different radiation exposure to members of an endovascular surgery team. Knowledge of the variable intensity of radiation exposure may allow modification of the technique to minimize radiation exposure to the team while providing suitable imaging.

Clinical Relevance

The increased utility of endovascular procedures has exposed interventionalists to potentially high levels of occupational radiation. This study demonstrates that the magnitude and distribution of scatter radiation can be measured to the operator, assistant, and anesthesiologist under various fluoroscopic imaging conditions and techniques. Knowledge of the various angiographic parameters and their impact in scatter radiation levels can help operators utilize the dose reduction techniques and incorporate them in their routine practices.

« PreviousNext »**Journal of Vascular Surgery**
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Catheter-based Radiofrequency Renal-nerve Ablation in Patients with Resistant Hypertension

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- Full Text
- PDF

Article Outline

- Copyright

This review aims to describe the role and the results of catheter-based renal nerve ablation for the treatment of resistant hypertension. Despite the availability of multiple classes of orally active antihypertensive treatments, resistant hypertension remains an important public health issue in 2012 due to its prevalence and association with target-organ damage and poor prognosis. The failure of purely pharmacological approaches to treat resistant hypertension has stimulated interest in invasive device-based treatments based on old concepts. In the absence of orally active antihypertensive agents, patients with severe and complicated hypertension were widely treated by surgical denervation of the kidney until the 1960s, but this approach was associated with a high incidence of severe adverse events and a high mortality rate. A new catheter system using radiofrequency energy has been developed, allowing an endovascular approach to renal denervation and providing patients with resistant hypertension with a new therapeutic option that is less invasive than surgery and can be performed rapidly under local anaesthesia. To date, this technique has been evaluated only in open-label trials including small numbers of highly selected resistant hypertensive patients with suitable renal artery anatomy. The available evidence suggests a favourable blood pressure-lowering effect in the short term (6 months) and a low incidence of immediate local and endovascular complications. This follow-up period is, however, too short for the detection of rare or late-onset adverse events. For the time being, the benefit/risk ratio of this technique remains to be evaluated, precluding its uncontrolled and widespread use in routine practice.

« PreviousNext »**Journal of Vascular Surgery**
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Association of Program Directors in Vascular Surgery (APDVS) survey of program selection, knowledge acquisition, and education provided as viewed by vascular trainees from two different training paradigms

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- Abstract
- Full Text
- PDF
- References

Methods of learning may differ between generations and even the level of training or the training paradigm, or both. To optimize education, it is important to optimize training designs, and the perspective of those being trained can aid in this quest. The Association of Program Directors in Vascular Surgery leadership sent a survey to all vascular surgical trainees (integrated [0/5], independent current and new graduates [5 + 2]) addressing various aspects of the educational

experience. Of 412 surveys sent, 163 (~40%) responded: 46 integrated, 96 fellows, and 21

graduates. The survey was completed by 52% of the integrated residents, 59% of the independent residents, and 20% of the graduates. When choosing a program for training, the integrated

residents are most concerned with program atmosphere and the independent residents with total clinical volume. Concerns after training were thoracic and thoracoabdominal aneurysm procedures and business aspects: 40% to 50% integrated, and 60% fellows/graduates. Integrated trainees found periprocedural discussion the best feedback (79%), with 9% favoring written test review. Surgical training and vascular laboratory and venous training were judged "just right" by

87% and ~71%, whereas business aspects needed more emphasis (65%-70%). Regarding the 80-

hour workweek, 82% felt it prevented fatigue, and 24% thought it was detrimental to patient care. Independent program trainees also found periprocedural discussion the best feedback (71%), with 12% favoring written test review. Surgical training and vascular laboratory/venous training were "just right" by 87% and 60% to 70%, respectively, whereas business aspects

needed more emphasis (~65%-70%). Regarding the 80-hour workweek, 62% felt it was

detrimental to patient care, and 42% felt it prevented fatigue. A supportive environment and adequate clinical volume will attract trainees to a program. For "an urgent need to know," the integrated trainees are especially turning to online texts rather than traditional textbooks, which suggests an opportunity for a shift in educational focus. Point-of-care is the best time for education and feedback, suggesting a continued need for dedicated faculty. The business side of training is underserved and should be addressed.

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Early results and lessons learned from a multicenter, randomized, double-blind trial of bone marrow aspirate concentrate in critical limb ischemia

Presented at the Thirty-seventh Annual Meeting of the New England Society for Vascular Surgery, Rockport, Me, September 23-26, 2010.

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- George Geils, MD
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- Alan Lumsden, MD
- Eric Peden, MD
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- Abstract
- Full Text
- PDF
- References

Objectives

Despite advances in endovascular therapies, critical limb ischemia (CLI) continues to be associated with high morbidity and mortality. Patients without direct revascularization options have the worst outcomes. We sought to explore the feasibility of conducting a definitive trial of a bone marrow-derived cellular therapy for CLI in this “no option” population.

Methods

A pilot, multicenter, prospective, randomized, double-blind, placebo-controlled trial for "no option" CLI patients was performed. The therapy consisted of bone marrow aspirate concentrate (BMAC), prepared using a point of service centrifugation technique and injected percutaneously in 40 injections to the affected limb. Patients were randomized to BMAC or sham injections (dilute blood). We are reporting the 12-week data.

Results

Forty-eight patients were enrolled. The mean age was 69.5 years (range, 42-93 years). Males predominated (68%). Diabetes was present in 50%. Tissue loss (Rutherford 5) was present in 30 patients (62.5%), and 18 (37.5%) had rest pain without tissue loss (Rutherford 4). Patients were deemed unsuitable for conventional revascularization based on multiple prior failed revascularization efforts (24 [50%]), poor distal targets (43 [89.6%]), and medical risk (six [12.5%]). Thirty-four patients were treated with BMAC and 14 with sham injections. There were no adverse events attributed to the injections. Renal function was not affected. Effective blinding was confirmed; blinding index of 61% to 85%. Subjective and objective outcome measures were effectively obtained with the exception of treadmill walking times, which could only be obtained at baseline and follow-up in 15 of 48 subjects. This pilot study was not powered to demonstrate statistical significance but did demonstrate favorable trends for BMAC versus control in major amputations (17.6% vs 28.6%), improved pain (44% vs 25%), improved ankle brachial index (ABI; 32.4% vs 7.1%), improved Rutherford classification (35.3% vs 14.3%), and quality-of-life scoring better for BMAC in six of eight domains.

Conclusions

In this multicenter, randomized, double-blind, placebo-controlled trial of autologous bone marrow cell therapy for CLI, the therapy was well tolerated without significant adverse events. The BMAC group demonstrated trends toward improvement in amputation, pain, quality of life, Rutherford classification, and ABI when compared with controls. This pilot allowed us to identify several areas for improvement for future trials and CLI studies. These recommendations include elimination of treadmill testing, stratification by Rutherford class, and more liberal inclusion of patients with renal insufficiency. Our strongest recommendation is that CLI studies that include Rutherford 4 patients should incorporate a composite endpoint reflecting pain and quality of life.